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THE CONCEPT OF "EDUCATION THROUGH LIFE" IN THE CORPORATE TRAINING SYSTEM

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Annotation. *Being an ever-renewing process, education is influenced by the conditions of the historical epoch and the tasks that society sets for it. Accordingly, in a changing world, education faces the problem of obsolescence of theoretical concepts and methodological approaches. The increase in the speed of development of society and the economy, the activation of the mobility of the population in the labor market led to the transformation of the needs of the population in training, necessitating the practical implementation of the conceptual installation "education through life". The article states the importance of the principle of continuity in the education system, in which the state, companies and employees are interested.*

Keywords: *education, continuing education, corporate education, human capital.*

The emergence of the concept of "education through life" was noted at the end of the last century and remains an actual research to which the works of scientists are devoted. (1, 2, 3, 4) In modern conditions, continuous education is necessary for every member of society, since it allows an individual to adapt to the conditions of a rapidly changing world. According to the researchers, continuous learning is the only way to meet the basic needs of human survival and development. In today's society, where the pace of technological updates is accelerating, and high-tech industries are emerging in an endless stream, the need for lifelong learning is becoming more and more urgent. (5, 6)

The high interest in the concept determines the definition of its significance for different levels: individual (employment opportunities, social integration), organizational (improving the competitiveness of the company, creating a favorable

environment for personal growth of employees), social (forming active and highly educated citizens). An important characteristic of lifelong learning is its compliance with the needs of social and personal development of a person. This is a training system in which modern teaching methods are constantly used, training opportunities, time and space are flexibly selected and arranged by all economic entities.

The importance of implementing the concept of "education through life" within the framework of the Institute of Education at the present stage is also evidenced by the high interest in the development of strategic directions for the development of this idea on the part of world-famous public organizations. For example, according to one of the Sustainable Development Goals formulated by the UN, lifelong learning, which provides for constant monitoring of the educational needs, opportunities and achievements of the adult population forced to make particularly important decisions regarding sustainable development, is important for the effective functioning of the education system at the national level. (7)

Scientists in their research pay special attention to models of continuous additional education, also touching on aspects of the "education for life" model. It should be noted that T. V. Aslamova uses the concepts of "lifelong learning" and "lifelong education" not as synonyms. From the logic of the presentation presented in the article, it can be concluded that, according to the researcher, the model of "education for life" precedes the model of "lifelong learning through life". Lifelong learning plays the role of the foundation for the development of specific human capital, contributing to the satisfaction of the needs of the individual in self-development, as well as solving the "problem of adaptation to changing conditions". (8)

Following the analyzed concept, we note that at the present stage in the internal environment of large corporations and national companies, there is a widespread tendency to create their own institute of education – a corporate university. (9) The Corporate University is an internal division of the company, whose activities are aimed at improving the quality of the company's workforce and the productivity of employees at all levels.

Corporate education at the present stage is the most effective tool for the development of human capital in the company and allows you to implement a policy of sustainable development, provide competitive advantages and innovative capital. (10, 11) The concept of "lifelong learning" is the concept of the survival of the enterprise in the new century and the only way to the sustainable development of all segments of society. (12) Lifelong learning is the main driving force of the continuous development of the corporation. Moreover, corporate employee training is a key element of stimulating the company's sustainable development and determines the company's future market share. The expansion from individual

training to group training, from partial training to training of all personnel, from "step-by-step training" to "continuous training", from "transfer of knowledge and skills" to "increase the ability to learn" has become the main trend in corporate training management. Corporate training refers to the training of employees in knowledge and skills in accordance with the working needs, so that employees can acquire the skills and knowledge necessary to conduct their professional activities. As the cells of the national economy, the development of enterprises contributes to the healthy and sustainable development of the national economy and the achievement of social harmony and stability. (13, 14, 15)

Corporate training, which is based on the principles of the "lifelong learning" concept, meets the requirements of a high level of adaptability and individualization of the learning process, openness and accessibility of educational teaching materials, the establishment of flexible and more free and friendly relations in the employee-company relationship, the formation of in-demand competencies in the learning process, motivation for the development of self-learning skills among employees, the development of communication skills.

Corporate training can be implemented using different forms. Among the most common are "on-the-job training, corporate development programs, e-learning, internal coaching, external conferences and events, off-the-job training, educational courses, blended learning, intra-corporate knowledge exchange, internal internships and rotation, social training, virtual classes, MOOK". (16) Consequently, the variety of forms that can be used in corporate training allows the company to choose the most rational form, to individualize the learning process based on the needs of students.

From the above, we can conclude that corporate education has become an absolute necessity to meet the needs of labor personnel and enterprises. On the one hand, it provides an opportunity for the company's employees to achieve the realization of the need for continuous training. The development of the need for continuous acquisition of knowledge, the desire of a person to resist in the conditions of competitive competition in the labor market, as well as the requirements of the modern era and rapid scientific progress, necessitated the transformation of the institute of education. Continuous learning has become an integral value of modern man. On the other hand, corporate education is necessary for the enterprise itself, since it allows it to satisfy its need for the formation of a highly qualified workforce.

References

1. Pozilova S. Rasulova N., Khalilova S., Aliyeva N., Rasulova M. The role of creative education in the development of lifelong learning in an innovative society: ways to organizing // Journal of Critical Reviews. 2020. No. 7. P. 379-383.

2. Cronholm S. Lifelong learning: Principles for designing university education // Journal of Information Technology Education: Research. 2021. No. 20. P. 35-60. https://doi.org/10.28945/4686

3. Suvorova G.M. The Universe is education through life / / Noospheric studies. 2021. No. 1. pp. 65-69.

4. Zheltenkov A.V., Demina V.V., Yalaletdinova E.A. Rynok obrazovatel'nykh uslug kak faktor razvitiya sovremennoi ekonomiki [Education Market as a Factor of Modern Economic De-velopment]. Moscow, MRSU Ed. off. Publ., 2014. 158 p.

5. Wang Yuqi Building a continuous learning education system that serves all people with the support of higher education // Higher education in the field of sciences. 2020. No. 4. pp. 17-18.

6. Chen Jiali, Hong Chunhua. A practical study of the construction of an education system that serves lifelong learning for everyone / / Research in the field of education. 2020. No. 3(10). pp. 168-169.

7. World Report on Education Monitoring. Education in the interests of people and the planet [Electronic resource] // http://unesdoc.unesco.org/images/0024/002457/245745R.pdf

8. Aslamova T.V. The role of additional professional education in the context of the paradigm "from education for life — to education through life" / / Education. The science. Scientific personnel. 2020. No. 1. pp. 124-125.

9. Korgina O. A. Corporate training as an effective tool for managing personnel development in an organization / / Bulletin of the Academy of Knowledge. 2021. No. 1 (42). pp. 191-196.

10. Pruzhinin A. N. The influence of the corporate university on the development of the human capital of companies / / Sociology. 2021. No. 1. p. 138.

11. Demina V. V. The needs of higher education institutions and employers' companies: a competence-based approach / / Modern education: vectors of development: The role of socio-humanitarian knowledge in teacher training: materials of the V International Conference (Moscow, Moscow State University, April 27-May 25. 2020) / under the general editorship of M. M. Musarsky, E. A. Omelchenko, A. A. Shevtsova. [Electronic publication of network distribution]. - Moscow: MPSU, 2020. - pp. 272-279. DOI 10.37492/ETNO.2020.63.77.033

12. Zhang Li, Yao Tingting. Analysis of training of new employees at small and medium-sized enterprises on the basis of continuous training / / Education Teaching Forum. 2018. No. 354 (12). pp. 130-131.

13. Demina V.V., Demina S.A., Zayakina I.A., Kozhukalova O.Yu. The main trends characterizing the knowledge society in Russia / / Azimut of scientific research: economics and management. 2021. Vol. 10. No. 2 (35). pp. 162-168. DOI: 10.26140/anie-2021-1002-0026

14. Demina V., Demina S., Kozhukalova O., Zayakina I. Quality of education as a requirement of modern society. // E3S Web of Conferences. 8. Cep. "Innovative Technologies in Science and Education, ITSE 2020" 2020. C. 22031. DOI: 10.1051/e3sconf/202021022031

15. Wang Xin, Geng Jinlong. Dilemma and countermeasures of training of employees of the enterprise from the point of view of the concept of lifelong learning // Journal of the College of Adult Education of Hebei University. 2017. No. 19 (2). pp. 52-55.

16. Bulganina S. V., Prokhorova M. P., Sergeeva A. A., Zubova A.D. The modern image of corporate training: trends and technologies / / Innovative economics: prospects for development and improvement. 2019. No. 2 (36). pp. 58-65.

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FORMATION OF SUSTAINABLE DEVELOPMENT OF ENTERPRISES BASED ON THE IMPLEMENTATION OF THE "INDUSTRY 4.0"PROGRAMS

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Abstract. *Sustainable development of enterprises is formed on the basis of the introduction of new technologies and the creation of unique developments. The priority directions of scientific and technological development of the country that can make the greatest contribution to accelerating economic growth, increasing the country's competitiveness through the development of the technological base of the economy and science-intensive industries are considered. The results of intellectual activity, new technologies, innovations in the production and management sphere, which have a significant role in the global market. he study reflects the main strategic objectives, key areas and methods in enterprise management to achieve sustainable development in the context of digitalization. The "Industry 4.0" program is a multi-level system based on the idea of integrating physical and intellectual-software processes into a single information space. This program consists of subsystems: product life cycle management; support for large-scale databases; creation of the "Internet of Things" - IoT; construction of "smart" enterprises; formation of cyber-physical systems. The "Industry 4.0" program provides for the digitalization and integration of technological, manufacturing and business processes vertically throughout the enterprise, from product development and procurement to manufacturing, logistics and in-service service. The development strategy of the enterprise provides for the introduction of innovative technologies, full-scale use of intellectual, scientific, and creative resources. Determination of indicators of sustainable development of the organization, identification of new characteristics and indicators in the information space, preparation of the organization's management system for new conditions of work in the market, training of innovative personnel to work in the "Industry 4.0" system*

Keywords: *digital transformation, digitalization, innovation strategy, technological development, software products, intelligent systems*

Introduction

The study reveals the role of new technologies, indicates the need for their intensive implementation in the production sector, analyzes the state of industry in the regions, and reveals the role of digital platforms. The relevance of the study in revealing new opportunities for creating a highly competitive enterprise at all stages of the innovation process, since digital transformation accelerates the processes of transferring knowledge and organizing network communications. The constant exchange of ideas and the sharing of data make the innovation process continuous. The purpose of the study is to analyze the factors of sustainable development of enterprises in interaction with the external environment in the context of digitalization and disclosure of management methods for new technologies. The subject of research is the sustainability of industrial enterprises. The object of the study is the sustainability of high-tech enterprises interacting in a digital environment in a competitive environment in global markets. The efficient use of the possibilities of the external environment ensures the development of the "Industry 4.0" system.

The innovation policy determines the goals, directions, forms of activity of public authorities in the field of science, technology and the implementation of the achievements of science and technology.

Research methods include analysis of scientific publications in the field of sustainable development; forecasting and analytical developments; special domestic and foreign literature; materials of scientific and practical conferences and seminars, round tables; materials of information and analytical agencies.

Analysis of the problems of sustainable development of enterprises shows the importance of constant development of its competitive advantages, which is facilitated by the "Industry 4.0" program. It includes:

1. Intelligent production management systems, including in robotics and the Internet of Things.

2. Systems for monitoring production processes, including sensors for the state of equipment, parameters of raw materials flows and the state of objects being created.

3. Multidimensional modeling of complex products, allowing you to optimize their various parameters.

4. Systems for creating and transforming material objects, including: 3D-program; promising methods of surface treatment. Mechanical engineering technologies are key for this area [1,2].

Advances in these areas can provide visible economic benefits in addressing multiple production challenges. Industrial complexes based on these technologies are regulated by measures of industrial, innovation, scientific and educational policies. Strategic competitive advantages provide dynamic sustainable development. Consider the UN Member States 2030 Agenda for Sustainable Development. Highlight Goal 9: "Build resilient infrastructure, promote inclusive and sus-

tainable industrialization and innovation. By 2030, modernize infrastructure and re-equip industrial plants to make them sustainable through improved resource efficiency and increased use of clean and environmentally sound technologies and industrial processes, with the participation of all countries according to their individual capacities. Intensify scientific research, build up the technological potential of industrial sectors in all countries".

Innovative development of enterprises (the program "The 2030 Agenda for Sustainable Development of the UN Member States". We highlight Goal 9: "Creating a resilient infrastructure, promoting inclusive and sustainable industrialization and innovation) is a strategic system of innovative, organizational and managerial solutions aimed at achieving its goals and objectives. Advanced manufacturing technology makes extensive use of computer, precision and information components integrated with a high-performance workforce, creating a system that is flexible to respond quickly to customer needs. In the high-tech sector, unique technological solutions appear, on the basis of which new equipment and new equipment are created. Fig. 1 highlights the subsystems of digital transformation.

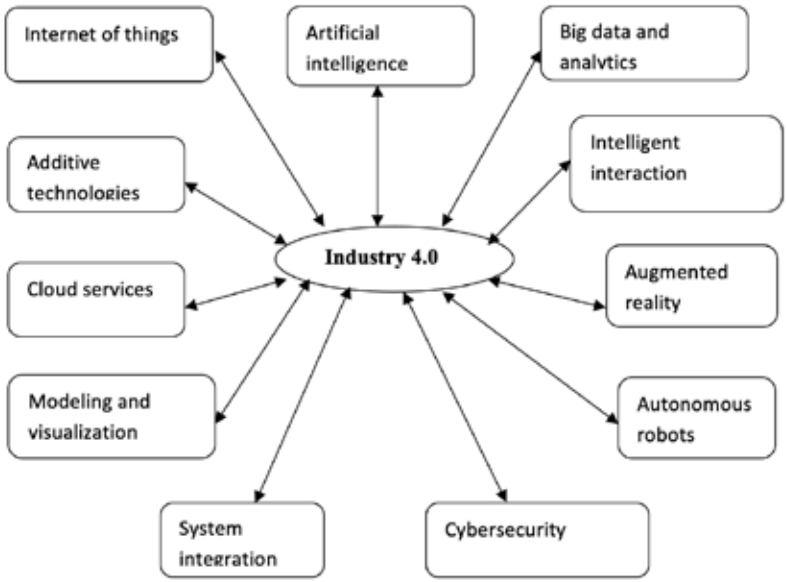

Fig. 1 Use of subsystems of digital transformation.

Digital transformation subsystems are used to make more accurate decisions and automation in every area of production management. Digital technologies are

becoming a key component of the economy. Analysis of innovative and digital strategies of various countries shows that the creation of digital technologies and their embedding in the economy is becoming the main goal of innovative development. Analytics powered by big data and artificial intelligence. "Industry 4.0" involves the collection of big data from a wide range of sources - from production equipment and devices of the Internet of Things (IoT) to ERP and CRM systems [3,4]. The big data on which "Industry 4.0" is built is stored in the cloud, and the cyber-physical systems at the heart of the concept use the cloud to communicate and coordinate. The Industrial Internet of Things (IIoT) technology enables companies to optimize supply chains, quickly design and modify products, prevent equipment downtime, stay on top of consumer preferences, track products and stocks - and much more.

Additive Manufacturing / 3D Printing. Additive manufacturing, or 3D printing, offers a wider range of application scenarios, from mass customization to distributed manufacturing. With 3D printing, parts can be stored as design data files in virtual warehouses and printed on demand at the time of need. Augmented reality (AR). Augmented reality tools that overlay digital content on the real environment are a key component of "Industry 4.0". In augmented reality environments, employees use smart glasses or mobile devices to visualize real-time IoT data, digitized parts, repair or assembly instructions. Integration of production and network communications is the main goal of "Industry 4.0". Created on the basis of advanced software, artificial intelligence, including sensors and machine vision, robots are capable of performing complex and high-precision tasks, can recognize and analyze information received from the environment, and act on it. The production process covers the entire cycle of transforming knowledge into an innovative product according to the scheme: science - technology - product - market [5]. The development and diffusion of innovative technologies is very important for achieving the goals of sustainable development of enterprises. "Industry 4.0" is new technologies that unite the physical, digital and biological worlds, affecting all industries and the economy. The possibility of interconnection for various components opens up prospects: the development of "smart manufacturing"; improving the basic competitiveness of the manufacturing industry; introduction of innovations in the production of high-tech equipment. Three levels of digital production: auxiliary systems; cyber physical systems and artificial intelligence. Digital platforms in the manufacturing sector are essential to modernize industries, increase productivity, optimize resource allocation and increase employment. To analyze modern developments, we will consider the development of new technological directions for creating new equipment, high-speed vehicles and various intelligent control systems for new types of transport. The application of smart digital technologies in practice, the peculiarities of developing tools and methods

for digitalizing complex economic systems can be observed in the following industries: 1. The ICT, electrical and electronics (ICT) sector can show significant growth as it is a supplier of many technologies that will be required by other industrial sectors. 2.Vacuum magneto-levitation transport (VMLT), which uses an unconventional method of maintenance - magnetic suspension and stabilization in a vacuum environment [6,7]. 3. Technologies of "Industry 4.0" are used in oil and gas companies. Drilling works are carried out in a fully automatic mode, and new technologies allow autonomous inspection of pipelines, as well as equipment and abandonment of equipped wells. 4. Systematization of technological solutions for the coal industry in Russia, created on the basis of plans for the implementation of the project "Industry 4.0." 5. "Smart production" is being created - highly qualified workers who know practical and information technologies. Smart Manufacturing takes highly skilled workers to a whole new level. Maintenance work requiring high skill levels will mostly be outsourced. 6. Artificial intelligence gradually begins to assist a person in fulfilling his duties, for example, in recruiting personnel (Robot Vera), in driving cars (Cognitive Technologies), in organizing the work of lawyers, in the fire safety system [8].

The Digitising European industry provides access to digital technologies for all companies in all sectors and regions. To this end, the EU seeks to: coordinate national platforms according to "Industry 4.0", create "digital innovation centers" in each region and set standards, encourage leadership on digital industrial platforms, create large-scale pilot projects [10].

"Industry 4.0" is based on the Industrial Internet of Things (IIoT) and cyber-physical systems - intelligent autonomous systems that use computer algorithms to monitor and control physical things. Digital transformation is an integrated implementation of process innovations, significant changes in technology, equipment and software.

Adaptation of automated functions to changes in external conditions, predictive data analytics, digital display of processes, analysis in control systems PMS, MES, etc. Services and production management systems (Manufacturing Execution Systems, MES) are used by industrial enterprises to organize planning, control, monitoring and management the whole production process. Create reports, dashboards, and analytic capabilities to track product release, resource utilization, or equipment performance. With predictive analytics tools, enterprises can analyze and predict processes over time, identify trends, anticipate change, and therefore better plan for the future.

An important parameter of the functioning of a high-tech enterprise and production is a high proportion of the intellectual component, in particular the availability of the results of intellectual activity, objects of intellectual property. The patent landscape primarily helps to determine the development priorities, scien-

tific and technological program, and the competitiveness of technologies. When using a digital platform, analyzing patent information, it is possible to determine the development strategy of the organization, technological, research, investment priorities, to obtain a higher result when conducting research and development and introducing developments into the production cycle [3,11]. With the help of patent technology intelligence, it is possible to conduct competitive analysis, select technology directions for investment and a patenting strategy. Appraisal firms assess the viability of a patent for an invention. The implementation of the "Industry 4.0" project implies the creation of a “smart” industry, which has evolved from the use of embedded information and communication control systems to cyber-physical systems. It is necessary to introduce new technologies of the domestic industrial complex, to ensure the rapid replacement of outdated equipment with progressive ones. Digital transformation is driving a dramatic increase in the productivity and value of enterprises.

The products of those regions that are actively introducing new technologies are effective. It is shown that the industrial revolution led to the creation of digital industries, the automation and robotization of which accelerated production processes and significantly increased quality indicators. Digital transformation is a leading area of technological development in the industry.

It is necessary to ensure the interconnection of strategies, innovations and investments in the system of ensuring sustainable development of enterprises and to use the experience of the "Strategy Europe 2020" program, which was launched in the European Union in 2006 and is aimed at "smart, sustainable and inclusive growth". It is aimed not only at economic growth, but in fact takes into account a large number of social factors and the need to adjust the policies of the EU and the participating countries in the field of education and social security. Three dimensions of sustainable development: social, economic and environmental, it is necessary to comply with their conditions for a high-quality human existence. Industrial cooperation contributes to sustainable development and includes:

- organization of joint ventures for the creation and production of innovative products;
- production agreements (supply of technologies and their adaptation to new materials, production line);
- commercial agreements for the development, installation and maintenance of new production technologies;
- making direct technical investments.

Enterprises with a developed mechanism of sustainable development achieve better results. Key processes of the enterprise: innovative, technological, resource, competitive. The formation and operation of the technological platform is carried out in accordance with the following general principles:

· Focus on solving strategic problems of the development of the national economy, priority state interests, meeting the most important social needs;

· Focus on research and development for solving medium and long-term tasks of the country's socio-economic development;

· The importance of the interests of business, key enterprises and consumers in the management bodies of the technology platform;

· A wide range of considered technological solutions, focus on the development of various technological alternatives;

Findings:

A systematic approach to the formation of sustainable development of an industrial enterprise includes the following stages of research:

1. Identification of the main priorities of sustainable development of an industrial enterprise, as a system or its individual activities, structural units, etc., as its individual elements.
2. Definition of the main software products of "Industry 4.0" to manage new technologies.
3. Development of a model for sustainable development of the enterprise.

Conclusion

The implementation of "Industry 4.0" programs raises innovative enterprises to a higher level. Smart manufacturing is becoming the norm in a world where smart ICT machines, systems and networks are able to independently exchange and respond to information to control industrial and manufacturing processes. Science and high technology are essential for a sustainable enterprise. Factors of sustainable development of enterprises determine the main criterion for its existence - competitiveness, technological advantages, profitability, long-term development prospects and sustainability. Technological platforms, which have begun to be widely used in different countries, have become a platform for interaction between scientific and educational institutions, industrial enterprises.

References

1. *Tarasov I.V. Approaches to the formation of a strategic program for digital transformation of an enterprise // Strategic decisions and risk management. 2019. V. 10. № 2. P. 182-191*

2. *Digital economy, smart innovations and technologies: collection of works of the National (All-Russian) sci.-pract. conf. with foreign participation, April 18–20, 2021, St. Petersburg / ed. dr. econ. sci, prof. D. G. Rodionov, dr. econ. sci, prof. A.V. Babkin. – SPB. : POLYTECH-PRESS, 2021. – 657 P.*

3. *Ustinova L.N. Digital platforms for the development of innovation // Digitalization of economic systems: theory and practice. Monograph/ ed. dr. econ. sci, prof A.V. Babkin. –SPb.: Polytech-PRESS. 2020 -P.98 -118, P 796.*

4. *Babkin A.V. Digital Economy and Industry 4.0.: New Challenges: Proceedings of a Scientific and Practical Conference with International Participation./ed. dr. econ. sci, prof A.V. Babkin.- SPb. Publishing house of Polytech. un-ty. 2018.-573 P.*

5. *Sannikova T.D., Bogomolova A.V., Zhigalova V.N. Foreign models of digital transformation and prospects for their use in Russian practice // Economic relations. – 2019. – Volume 9. – № 2. – P.□481-494.*

6. *Bauernhansl T. (2014). Die Vierteindustrielle Revolution -Der Weg in einwertschaffendes Produktions paradigma. In Industrie 4.0 in Produktion, Automatisierung und Logistik, T. Bauernhansl, M. ten Hompel, und B. Vogel-Heuser, Hrsg. Wiesbaden: Springer Fachmedien Wiesbaden, P. 5-35.*

7. *Drozdov B.V. On the promising shape of the global transport system // Culture. People. Ecosphere. Proceedings of the sociocultural seminar named after V.V. Bugrovsky. - M.: Sputnik, 2017. - Iss. 10. - P. 154-187.*

8. *Paulus-Rohmer D., Schatton H., und Bauernhansl T. (2016) Ecosystems, Strategy and Business Models in the age of Digitization - How the Manufacturing Industry is Going to Change its Logic», Procedia CIRP, Bd. 57, P. 8-13.*

9. *Urinson Ya.M., Panfilov K.S. Digitalization as a factor in the development of innovative strategies as exemplified by some enterprises / Journal "BUSINESS. SOCIETY. POWER". September 2020. №2-3 (36-37).*

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MANAGEMENT PARADIGM OF SPATIAL SOCIO-ECONOMIC DEVELOPMENT OF SUB-LOCALITIES

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Abstract. *The article reveals innovative approaches and models of economic management sub- localities (both individual municipalities and their groups formed on the production or territorial economic principle) in the spatial structure of the socio- economic development of the modern region*

Keywords: *sub-locality, innovative approaches, models, economic management, municipalities, spatial development, region.*

Formulation of the problem

The needs of the innovative development of the Russian economy, due to the tasks of a steady increase in the standard of living of the population, individual territorial units, necessitate the search for new forms of organization and management of the economy, a more complete use of local resources and factors in the socio-economic development of territories. In solving this problem, along with the traditional regional and local levels of government, the synergetic resource of new organizational and economic structures corresponding to the status of localities remains practically unused. All this presupposes the need to develop and establish a new management paradigm for the development and regulation of the processes of formation, distribution and use of economic resources of spatially localized systems, for a more complete use of the resource potential of localities of the municipal and subregional (supra-municipal) level of management.

Research analysis and publications

The multivariance of approaches and solutions to the problems of innovative mechanisms and schemes of economic management on the scale of sub-localities of various levels taking place in scientific research and practical management is a confirmation of the advisability of additional research in this area, the development of new heuristic and empirical aspects of the formation of systems for regulating the development of the economy of territories.

At the same time, despite the variety of studies aimed at developing methodological approaches, means and technologies for managing the economy of sub-localities, the degree of scientific development of this problem cannot be considered sufficient.

For the practical implementation of the tasks of innovative development of territories in the future period using the potential of sub-localities, the development of effective management approaches and vectors, a more developed scientific and methodological base is needed, formed on the basis of research materials of modern processes of territorial management in Russia. The resource of cluster forms of coordination and motivation of business activity of economic entities at the subregional level remains largely unrealized.

The purpose of research is to test the developed innovative approaches and models of economic management of sub-localities (both individual municipalities and their groups formed according to the production or territorial economic principle) in the structure of the spatial socio-economic development of a modern region.

Results of research

The developed conceptual mechanism for managing the spatial socio-economic development of sub-localities and their production, social and institutional infrastructure based on innovative components, such as models for improving the efficiency of subregional economy management, financial support systems, alternative prospects for the development of the economies of sub-localities of Krasnodar Krai (in the spatial aspect) , allowed:

1. Take a fresh look and deepen understanding of the subject content of the category "sub-locality", within which it is proposed to identify its essence as the economic integrity of the territory of public self-government or their group, endowed with a production and marketing function with the administrative body of functional processes and interconnections to ensure maximum high standard of living of the population and optimally favorable conditions for doing business.

2. To identify new forms of influence and tools for managing spatial socio-economic development at the level of the territories of the sub-localities, which makes it possible to structure promising process areas of interaction between regional, municipal authorities, business structures (economic entities) and structures of civil society in the Krasnodar Krai.

3. To substantiate the need for the spatial distribution of economic resources between the territories of the sub-localities of the Krasnodar Krai, which are leaders, to determine the rank values and areas for improving their management.

4. To propose innovative approaches to improving the system of financial support of sub-localities, within the framework of which a simulation organizational and economic model for increasing the efficiency of economic management of sub-localities and a model of financing the performance of sub-localities of functions involving the adaptation and improvement of the activities of state and non-state institutions at the federal and regional levels have been formed.

5. To establish the vectors of economic development of the sub-localities of the Krasnodar Territory, including: the formation and maintenance of a favorable economic and political situation in the sub-localities and the improvement of the investment climate; introduction of a mechanism for attracting long-term investments; optimization of the organizational structure of local government; development of the innovative potential of the economy of the territories.

Conclusion

The management of the spatial socio-economic development of sub-localities and their production, social and institutional infrastructure based on innovative components will contribute to the successful strategic development of sub-localities, strengthening their role in the national economy and gaining leading positions in the foreign market, activates the comprehensive use of the resource potential of localities of the municipal and sub-regional (supra-municipal) level of management. Sub-localities as independent units of the spatial organization of life (territorial-economic community) in the structural-level organization of the Russian economy management system can become basic elements that include all processes, functional structures, components, both their own and other levels corresponding to their territorial location hierarchy of territorial and economic communities; innovative development of territories in the prospective period is possible when using the potential of sub-localities, developing effective management approaches and development vectors.

References

1. Dzharimov A.A., Popov R.A. Prospects for the development of the industrial sector in Russia in the context of aggravated global competition // Bulletin of the Adyghe State University. Series Economics. 2012. No. 1.

2. Zhukov B.M. Management technologies for flexible development of an enterprise based on the processes of restructuring, logistics and increasing capitalization. Monograph. 2nd ed. - Moscow: Publishing and Trade Corporation "Dashkov and K", 2019. - 294 p.

3. Zhukov B.M., Russov A.S. The mechanism of effective management of the use of material conditions for the intensification of the spatial and economic development of the region. - Moscow: Publishing and Trade Corporation "Dashkov and K", 2018. - 176 p.

4. Zhukov B.M., Pankov V.S. Cluster technologies in the regional development strategy. - Moscow: Publishing house "Your polygraphic partner", 2014.-178 p. (Series: Library of the journal "Economics and Entrepreneurship").

5. Zhukov B.M., Osin A.A. The role of the state in the regulation of socio-economic processes in the region: theoretical aspect // Economy and entrepreneurship. - 2012. - No. 2. P. 36-40.

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GAMIFICATION AS AN INNOVATIVE HR MANAGEMENT TOOL FOR A MODERN COMPANY

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Abstract. *In modern conditions, gamification has become one of the discussed management technologies. The attention of the academic community and business practitioners is focused on the study of a new phenomenon - gamification (the use of game elements in various non-game contexts). Despite the growth of research interest and the expansion of application practice, the concept of gamification is not sufficiently developed theoretically, there are no standardized rules and procedures for its implementation in the activities of companies. The article examines the theoretical and applied issues of gamification, identifies the problems and prospects of its development in the personnel management of a modern company.*

Keywords: *gamification, personnel management, gamification project; internal and external gamification*.

The personnel of the company is one of the leading assets allowing to ensure high economic results and its competitiveness in the conditions of a dynamically changing external environment. To ensure the effective use of this asset, companies must: find effective ways to recruit the "best" employees; reduce the monotony and routine of labor operations, ensuring the involvement of employees in the company's activities; develop motivation programs that allow employees of organizations not only to demonstrate high productivity, but to find a balance between personal life and work. Due to the growing competition for "quality" human resources in the labor market, companies are forced to perform a number of non-specific social functions. For example, to provide employees not only with comfortable working conditions and decent wages, but also to organize leisure in the workplace, to promote the development of skills and competencies of employees that are not directly related to work functions and tasks, and to help solve personal affairs. Increasingly, HR managers are using concepts such as pleasure in doing work, fun in the work process, fun in completing tasks, and companies are looking for new management tools and technologies that can turn even the

most monotonous work into fun. One such technology in recent years has been gamification.

Modern companies are looking for new approaches and tools to create an effective HR management system. One of these tools is gamification [1].

The first attempts at introducing gamification were unknowingly undertaken by the American fast food company "Kellogg Company" in 1910. The company announced a promotion that included a reward (decal book) for every two boxes of cereal purchased.

After two years, the snack firm Cracker Jack has implemented a similar game-based customer reward system. So, in every product released by the company, a prize was added (from stickers to baseball cards). Over the next 100 years, the company released about 23 billion products with gifts inside, and the inscription "Prize in every box" became a hit [2].

Despite the fact that by 1950 the understanding of gamification had not yet been formulated, its main element - positive emotions - already allowed to rapidly increase the level of consumer motivation and thereby led to increased sales [3].

It is difficult to unequivocally answer the question about the first researcher in the field of introducing game elements into the personnel management system. Several sources point to Canadian consultant Gabe Zichermann as a pioneer. He subsequently co-authored Game-Driven Marketing (2010) and Gamification by Design (2011), as well as Chairman of the Gamification Summit.

However, it is worth noting that the work of the American Charles Kunradt, the founder of The Game Of Work, was previously published. In his work, he proposed the idea of using games in the workflow to motivate employees. His proposals were not implemented at the time of their appearance, but were a source of analysis for the advancement of a modern approach to the study of this problem.

The term gamification in the modern sense has appeared relatively recently in the international business environment. It was proposed by N. Pelling in 2002. The widespread use of the term in the United States occurred only in 2010, this became possible due to the processed results of the use by companies of various business sectors of a new marketing move that successfully combines gaming and social media technologies [4].

In Russia, the process of gamification was made public in August 2012 thanks to the training course "Gamification" led by Professor of the University of Pennsylvania K. Werbach [5].

At the moment, gamification does not have a lot of practical experience in its application in Russia, therefore this tool is often confused with other concepts and is often given an incorrect, distorted meaning.

The authors who study the processes of game thinking are unanimous in the opinion that gamification does not have to be presented in the form of a game, but it implies the application of psychological aspects inherent in the game process. At

the same time, the most important element of this method is to provide instant and measurable feedback to the user. In this vein, feedback serves as a motivational stimulus and helps the user to track progress and, if necessary, make adjustments to their behavior.

Broadly understood, gamification is the process of applying the elements and properties of a game in a non-gaming context. It is important to note that the opinions of researchers on the issue of the identified categories of elements differ [6].

K. Kanningen and G. Zikkerman in their research expressed an opinion on the relationship between the selected game elements and the final effectiveness of gamification programs. So, the effectiveness of the application directly depends on the goals and expected results, the methods used to adapt personnel to the innovation system, as well as on the degree of organization of feedback to the users of the program [7].

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K. Werbach and D. Hunter continued to study the approach of gami ed systems from the point of view of considering them as a business tool. The authors suggest that the modern internal processes of the company are rapidly passing through the stages of merging with the world of game design, in which gamification acts as an intermediary between the game and practical tasks.

According to K. Hiotari and J. Hamari, gamification should not be equated with an inferior game. They view it from the angle of the formation of a new experience, which tends to grow rapidly. From the point of view of this theory, it is necessary to focus on the process of user interaction with the gamification system, without taking into account the type of the final product. Thus, attention is shifting from the highlighted elements of the game to the experience that can be acquired in the process of using gamification systems [9].

Summarizing the currently existing approaches, we can say with confidence that gamification is an innovative tool for solving various kinds of business problems, which involves the use of game elements and contributes to the formation of new experience in the non-game process.

In this context, the main aspects of gamification are:

- interaction processes (ensuring user interaction with each other);

- game aesthetics (creating conditions conducive to a positive emotional outburst, which in turn serves as a tool for user engagement and motivation);

- feedback from the system (use of points, rewards and statuses to confirm the user level increase) [10].

Together, these elements contribute to the formation of new experiences and serve as a guarantor of the effective use of gamification systems.

In the modern world, all areas of human life are undergoing rapid changes. Given this problem, companies have to react quickly to external conditions and adapt to market demands. The ability to analyze the available tools for managing business processes, as well as to develop to create innovative methods becomes a prerequisite for the existence of a company.

Approaching the process of creating new methods, many factors are taken into account, of which the most significant is the compliance of the technology with modern standards and market requirements [11].

For about 10 years, there has been an active absorption of various types of leisure activities into games. The idea of people's need for play was first expressed by Henry Murray in his motivational concept. In addition, the author identified this need among the main ones and described it as a means of self-realization and adaptation [1].

A generational shift in the labor market can also be noted. For example, generation Y (born after the 1980s) has a strong interest in information technology and, thus, sets the direction for the work of HR services, which are looking for innovative tools to engage this generation in the workforce. Thus, taking into account these trends, companies began to use gamified systems to solve various kinds of problems, including to attract employees and improve their work efficiency [2].

Based on the research data, it can be concluded that the potential of gamification as a personnel technology is underestimated by the world community. However, despite this, the forecast of the company Gartner, which specializes in the analysis of modern consulting technologies, speaks of a further increase in demand for the use of gamification by companies around the world [12].

Despite the positive forecasts, there are also critics of gamification, who highlight a number of negative factors. Among them, the most significant is the risk of changing a person's internal motivation to external rewards. Feeling of control and manipulation is another of the problems inherent in all types of play activities.

Some researchers argue that gamification is not capable of achieving the goals identified before the implementation phase. Others consider the use of this tool in work activities unacceptable and point to the consequence of the use of gaming technologies, which is expressed in a decrease in labor productivity.

The described negative phenomena, of course, take place, however, they arise in most cases when the technology for creating a project is not followed, the goal

and objectives are incorrectly formulated, as well as when mistakes are made in the process of introducing the project into the organizational system. Another significant mistake that can reduce the effectiveness of gamification to a minimum is the poor design of the project [13].

Skeptical specialists tend to think that gamification is a kind of PR stunt created by marketers with the aim of making easy money. This can be refuted by the positive results from the application of gamification in practice, as well as the fact that this tool has been used by many well-known firms that have proven themselves in the market [14].

Gamification technologies are used as tools for the implementation of the following areas in the field of personnel management: staff recruitment; adaptation of personnel; staff motivation; training; team building.

The introduction of gamified projects in the recruiting process can help reduce the costs of recruiting, as well as improve the quality of the hired staff. In addition, gamification can also act as a talent pooling tool.

When carrying out adaptation measures, gamification allows you to reduce psychological tension and thereby significantly speed up the process of involving an employee in work.

Game-based motivational programs are highly sought after for their ability to bring entertainment into routine routines. Most often, this process is accompanied by the introduction of points, awards and statuses into the motivational program, which subsequently serve as the basis for the provision of any type of material or non-material incentives (bonuses, benefits, gifts, rolling awards, title assignment). Thus, using gamification as a motivation tool, the company develops competition between employees, and this, in turn, leads to increased efficiency and employee engagement [15].

In terms of staff training, gamification helps solve several significant problems. Of these, the most significant is the simplification of the perception by employees of a large flow of information. As another indisputable advantage of using gami ed systems in teaching, one can single out the ability to simulate non-standard situations that are rarely encountered in everyday work. This method can significantly reduce the risks associated with safety at industrial enterprises, which is especially important for industries where the safety of not only the organization, but also the whole country can depend on the behavior of people in emergency situations [16].

In team building, gamification is a kind of tool for creating a favorable psychological climate that promotes liberation, relieves stress, and also increases the level of creative activity.

Summarizing the directions of using gamification in personnel management, we can say that with the correct implementation of systems in a particular area, it is possible to achieve improved business results by increasing productivity, en-

gagement and retention of employees.

When using the elements of the game in the personnel management system, it is also important to take into account the possible forms of their manifestation.

In practice, the following forms of gamification systems are distinguished: competitive; victorious; aesthetic.

The competitive form implies the creation of certain conditions for a healthy competitive struggle between employees. Thanks to this process, a significant increase in staff motivation can be observed, but this directly depends on the organization of the event and the quality level of the preparatory measures. For example, one of the most important stages in the implementation of a competitive project in the personnel management system is its worthy coverage in the corporate environment. Thus, with the right preparatory measures, a competitive form of gamification can bring a company results in practical activities and, thereby, affect its financial performance.

The victorious form acts as a kind of tool for social recognition. A characteristic feature of this form is the recognition of all participants as winners, in the West this phenomenon is usually called the term "Win-win". In this regard, social encouragement and approval becomes a motivational stimulus. As an example, we can single out a project in which company employees received bonuses for voluntary assistance to colleagues. The accumulated bonuses could later be used by users to purchase real gifts. This method of using the victorious form of gamification helps to improve the psychological climate in the team, to form a sense of mutual assistance among the staff, and also to strengthen the team spirit as a whole.

The next form is aesthetic gamification. This form pursues the solution of a number of tasks, one of which is the formation of a clear idea of the goal and mission of the company in the team, as well as the subsequent correlation of these ideas with their own desires. A successful example of the application of the aesthetic form of gamification can be the creation of a corporate achievement system. An important condition for the effectiveness of such a system is the attainability of goals and the construction of a visual way of their implementation. As a rule, when using this approach, company personnel are interested in achieving more and more new results, thereby developing in their professional field [17].

Undoubtedly, in order to achieve the greatest efficiency from the introduction of gamification systems into the practice of personnel management, it is necessary to use all possible forms of gamification. However, often, for some reason (for example, financial) it is not possible to do this, so the optimal solution may be to use two forms at once.

Considering the above, it is important to highlight the aspects that influence the implementation of gamified systems.

A particular difficulty for HR managers in the process of introducing gamifi-

cation is the fact that there are limited specialists with the necessary competencies and are able to create a high-quality product that would correspond to the tasks set by the organization. The fact is that the development and implementation of game methods require diverse skills and abilities: knowledge in the field of programming and game design, ability in the development of training courses, as well as other narrowly focused and specific knowledge [18].

Authors studying the practical importance of gamification provide a number of tips for its implementation.

Firstly, one should not turn the innovative method into a tool for identifying negligent employees and give it a negative color, since in the presence of these conditions, the motivation of employees to the process completely disappears.

Secondly, it is necessary to conduct an analysis of possible risks, this requires the active work of HR managers, specialists of the legal department, as well as the participation of IT-technologies and corporate communications departments.

Third, it is important to take into account the characteristics of the personnel: its gender and age structure, the predominance of a certain type of generation, the level of resistance to change [19].

Thus, writing a project strategy comes down to the following points:

- analysis of business processes, as well as possible risks associated with the implementation of game elements;
- revealing the correlation of existing processes and game elements;
- definition of the goal and objectives of the project;
- creating a game strategy;
-selection of scenario elements typical for gameplay (awards, statuses, points);
- formulation of a list of measurable parameters by which information on user behavior will be collected [20].

Thus, the analysis of the theoretical foundations of gamification management as a personnel-technology allows us to conclude that gamification is an innovative tool for solving various kinds of business problems, which implies the use of game elements and contributes to the formation of new experience in the non-game process. Gamification technologies are used to improve the efficiency of personnel management in such areas as recruitment and selection of personnel, adaptation of personnel, as well as its training and motivation.

References

1. Dobychina N.V. Computer games - a theater of active actions // Philosophical problems of information technologies and cyberspace. 2013. № 1. P. 149-158.

2. Zemskova M.S. The introduction of gamification in the process of motivating personnel of generation Y / M.S. Zemskova, M.V. Krasnova // International research journal. 2016. № 10 (52). P. 29-33.

3. Markeeva A.V. Gamification as a tool for managing personnel in a modern organization // Russian Journal of Entrepreneurship. 2015. № 12. P. 1923-1936.

4. Dyatko K.D. Gamification and the possibility of its application in personnel management // Blog about personnel management. 2015. № 6. Access: http://dyatko.info.

5. Werbach K. Engage and Conquer. Game thinking in the service of business / Kevin Werbach, Dan Hunter. M.: "Mann, Ivanov, Ferber". 2015. 543 P.

6. Lyubko E.O. Hemification step by step: instructions for use // Human potential management. 2015. № 1 (41). P. 2-8.

7. Shatilova E.O. Gemification as a tool of corporate culture // Management of corporate culture. 2014. № 4. P. 246-251.

8. Mcgonigal J. Reality Is Broken: Why Games Make Us Better and How They Can Change the World: Blackwell Publishing, 2011. 121 P.

9. Vinichenko M.V. Monitoring of working conditions and the nature of their influence on health of students and academic staff. / A.V. Kirillov, E.V. Frolova, O.V. Kaurova, S.A. Makushkin. International Journal of Environmental and Science Education, 2016. 4564-4577 P.

10. Radoff J. Game On: Energize Your Business with Social Media Games: College Publishing, 2011. 35 P.

11. Schlender P.E. Personnel management / P.E. Schlender, V.V. Lukashevich, V.D. Mostova, A.N. Artemiev, Y. G. Soskin. M.: Unity-Dana. 2012. 367 P.

12. Konanchuk D.A. The era of "greenfield" in education // Blog about education. 2013. № 2. Access: https://goo.gl/JpCwPJ.

13. Kirillov A.V. Improvement in the learning environment through gamifica-tion of the educational process. IEJME - mathematics education, 2016. 2071-2085 P.

14. Deterding S. From Game Design Elements to Gamefulness: Defining Gam-ification: International Academic MindTrek Conference, 2011. 357 P.

15. Koster R. A Theory of Fun for Game Design: Paraglyph Press, 2005. 256 P.

16. Edery D. Changing the Game: How Video Games Are Transforming the Future of Business: FT Press, 2009. 71 P.

17. Brown T. A New Culture of Learning: Cultivating the Imagination for a World of Constant Change: The University of Michigan Press, 2011. 271 P.

18. Esaulova I.A. Personnel development: strategies, organization, practical solutions: monograph. Perm: Publishing house of Perm. state tech. un-ty. 2017. 178 P.

19. Fedorova N.V. Personnel management / N.V. Fedorov. O.Yu. Minchenkov. M.: KnoRus. 2016. 224 P.

20. Squire K. Video Games and Learning: Teaching and Participatory Culture in the Digital Age: Teachers College Publishing, 2011. 12 P.

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GASTRONOMIC TOURISM AS A FACTOR IN THE DEVELOPMENT OF THE REGIONAL ECONOMY

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Annotation. *Gastronomic tourism has a unique potential to attract tourists to the regions. This type of tourism is successfully combined with other types of tourism. The development of gastronomic tourism has a positive effect on the seasonal fluctuations of the tourist market. The methodology developed under the leadership of the World Tourism Organization (UNWTO) will allow the regions to develop gastronomic tourism more effectively.*

Keywords: *Gastronomic tourism, region, economy, World Tourism Organization (UNWTO), Republic of Bashkortostan*

Gastronomic tourism is becoming more and more popular all over the world. It is a developing form of tourism. UNWTO defines gastronomic tourism as "a type of tourism activity characterized by a visitor's experience of food and related products and activities while traveling." However, gastronomic tourism is not just food. Its foundation has more to do with the search for cultural immersion.

Gastronomy is one of the most appreciated areas for tourists. When we travel, we enjoy discovering local cuisine, exploring local restaurants, sampling typical products. According to UNWTO, more than a third of a tourist's spending is spent on food. Gastronomy often becomes one of the main reasons to travel.

It should be noted one of the essential properties of gastronomic tourism - the possibility of combination or combination with other types of tourism. The combination of two or more types of tourism can be called hybridization. Recent studies have shown that this process can empower regions by diversifying and expanding their tourism offerings with other types of tourism. The key to the success of this process is the division of tourism types into two groups: primary and secondary

segments. Gastronomic tourism is usually listed in the primary segment, while other segments (eg industrial tourism) are considered secondary. At the same time, gastronomic tourism (as a primary segment) will become a factor of attraction for industrial tourism (secondary segment). The most frequent cases of hybridization of tourism with gastronomy are: event tourism, cultural tourism and industrial tourism. Industrial tourism includes visits by tourists to operating industrial facilities and cultural heritage sites, the main activity of which is not focused on tourism. In recent decades, food tourism has emerged as a powerful driving force for hybrid tourism for travelers around the world.

Gastronomic tourism usually manifests itself in interaction with local producers, exploring the local culture first, while other segments (for example, industrial gastronomy, exposure to local markets, unique tourism) are considered secondary. The atmosphere of local restaurants, the tranquility of the countryside with their unforgettable landscapes, etc. are important here.

The trend towards standardization of modern gastronomy is emerging as a way to reduce costs, as tasty and easy-to-eat meals are becoming more common around the world. This jeopardizes the variety of food available and reduces the chances of experiencing the local culture through food as the place's distinctive cuisine becomes more and more isolated. The promotion of national culinary delights, which may not be well known outside their country of origin, presents a particular challenge. Due to the growing standardization of cuisines and the spread of cuisines of the world, some national cuisines may not even be particularly popular or famous in their own country or culture. The solution to this problem is a matter of fostering pride in national culture.

To turn a country into a gastronomic destination, people must be proud of their country's food. This pride can ensure that the quality and authenticity of food is not compromised in order to gain the attention of the mass tourism market. Staying true to the kitchen doesn't mean stagnation. Culinary innovation must be sustained in order to continue to attract gastronomic tourists in a competitive global market, while at the same time not losing sight of the core qualities of the local cuisine that underpin its unmistakable identity. It is important for the regions to develop a comprehensive communication strategy and a clear commitment to continuous innovation.

Good food tourism management requires a wide range of qualities, including strong leadership, creativity, teamwork, long-term vision, workmanship, and ambitious yet realistic goals. Teamwork involves collaboration at all levels: state-state, state-private, state-private-individual.

For countries such as France, Italy or Spain, gastronomy is an established and integral part of the tourist offer. But for many countries around the world, gastronomic tourism is still a novelty, albeit a useful one. Before establishing gastro-

nomic tourism in these countries, it is necessary to understand how it works. Often the national cuisine of a country is not perceived as a product that could potentially attract tourists from other regions of the country or the world. National cuisine can be original and varied, and this condition is necessary for the development of gastronomic tourism, but in itself is not enough.

Gastronomy is important from a business point of view. Sharing food promotes mutual understanding, and in the international business world, it is important to properly understand foreign cultures and know how to behave with respect.

Establishing links between tourism and local food producers is critical to maintaining local food culture. Tour operators bringing tourists to local farms and hotel chains buying food from local producers provide good examples. It is also important for food producers to work with chefs and exchange ideas. Chefs learn more about the ingredients they use and understand the seasonality of the products. Such linkages strengthen the value chain, bring economic benefits to local communities, preserve local culture, inspire pride in the local food culture, and bring great satisfaction to tourists.

Gastronomy plays a fundamental role in the diversification of tourism offerings through new cultural products and improved customer service. Possibly a decrease in seasonality in destinations due to gastronomic tourism: unlike other high seasonality market segments (such as winter tourism or sun and beach tourism), gastronomic tourism can be developed throughout the year, and it can also play a key role in attracting demand in low season. The territorial decentralization of tourism can also be encouraged by stimulating the local economy: gastronomic tourism can be an important tool for revitalizing local businesses and economies by promoting tourism services provided by local residents.

Gastronomic tourism is based on the traditions and customs of the local population, and therefore their participation, as well as their gradual adaptation to tourism through awareness raising and capacity building activities, is a key area.

In addition, gastronomic tourism not only contributes to an increase in international tourist flows and income, but also contributes to the development of domestic tourism. In this regard, it should be emphasized that tourism activity in the country is a major factor influencing the regional and local economy, offering income and employment opportunities in the regions.

Recognizing the importance of gastronomic tourism, the first World Forum on Gastronomy Tourism was organized five years ago together with the UNWTO Basque Culinary Center. In five years, gastronomic tourism has grown at all stages. These were the foundations that prompted, together with the UNWTO, to develop a Guide for the Development of Gastronomy Tourism, which will help and become a useful tool for those regions that want to position and strengthen their gastronomic strategy [1]. This toolkit was created to guide and support National

Tourism Organizations and Regional Governance Organizations and to support their efforts to develop and manage any form of gastronomic tourism, especially in the early stages of gastronomic development.

The guide describes some general principles and recommendations for the development of gastronomic tourism in the regions from the point of view of national transport agencies and regional management organizations. In addition, the document aims to assist on various key aspects in the planning and management of gastronomic tourism destinations, offering in each case a set of guidelines for the work to be done.

In particular, the UNWTO Global Gastronomy Tourism Reports, as well as the materials, reflections and conclusions of the four World Food Tourism Forums organized by the UNWTO and the Basque Culinary Center in 2015 in San Sebastian, in 2016 in Lima, in 2017 in San Sebastian and in 2018 in Bangkok [1].

The guide includes the following points:

1) *Planning and management of gastronomic tourism in the territory.* The competitiveness of a tourism destination is based on the planning and strategic management of its comparative and competitive advantages and is based on the creation of high quality various products that create a certain experience and added value for tourists.

2) *The food tourism value chain.* The tourism value chain is a sequence of primary and secondary activities that are strategically important to the activities of the tourism sector. Related processes such as policy making and integrated planning, product development and packaging.

3) *Analysis of trends in gastronomic tourism.* Trend analysis gives us insight into the main trends in the tourism sector, helping to understand the role that gastronomy plays in today's societies, especially as a key element of cultural heritage, as a tool for innovation and regional competitiveness, or as a driving force to achieve a goal.

4) *Comparative analysis and analysis of competitors in the regions.* Comparative analysis and competitor analysis is the first step towards determining the positioning of a gastronomic tourism region. As part of a gastronomic tourism strategy, it is important to conduct an analysis comparing the destination with other gastronomic destinations to see how they work in this area and explore their strengths.

5) *Quantitative and qualitative analysis of gastronomic tourists.* One of the important elements of external analysis of a tourism product is the study of both real and potential demand. Consumers are the main drivers of innovation, and their motivations, tastes and needs are changing at breakneck speed, marking the natural evolution of markets. To promote sustainable tourism development in the region, it is important to understand gastronomic tourists and their views on tourism and gastronomy, as well as know how this affects destinations.

6) *Analysis of the image of the region and gastronomic positioning.* For the further development of the gastronomic tourism strategy, it is important to analyze the image of the region in order to find out how potential customers think, what is their attitude and how they behave while traveling, as well as what role gastronomy plays when traveling.

7) *Determination of the competitive strategy of the region.* The region's gastronomic tourism strategy should be structured around the following four pillars:

- Tourism development model: mission and vision, main inspiring principles and strategic goals of the region;
- Territorial strategy;
- Competitive strategy for the gastronomic direction;
- Basic strategies: product strategy, priority target audiences, markets and positioning.

8) *Promote product development and innovation.* The product strategy aims to identify and classify all types of food tourism products that can potentially exist in the region so that they can be formulated and released to the tourism market. Creating a gastronomic product requires defining strategies for offering products, services and experiences to consumers that will allow them to immerse themselves in the essence and personality of the gastronomic culture of the territory. The design of the product must correspond to the gastronomic possibilities of the different parts of the territory and the needs of the demand. If the offer includes a large element of experience and emotion, then the products can be related to the feelings of potential visitors from different markets.

9) *Training, professionalization and job creation.* It is recognized that human capital is a determining factor in the competitiveness of any industry, especially in tourism, where “moments of truth” are key to meeting customer needs.

10) *Offering an unforgettable experience: quality assurance of service.* The travel experience has changed and is no longer limited to the actual days of the trip, but starts long before that, with preparation (inspiration, information retrieval, comparison, booking) and ends when the tourist evaluates and shares their impressions on social networks. In advanced societies, food is no longer a simple physiological need, but an activity aimed at excelling in daily activities. This trend also applies to food products, the purpose of which is to affect all five senses of the consumer, creating full-fledged internal sensory experiences. Consumers are looking for different original sensations closely related to pleasure. Therefore, it is necessary to develop attractive places and destinations that are pleasing to the eye and enjoyable to visit.

11) *Governance: promoting public-private cooperation.* Management in the tourism sector is a measurable government practice, the goal of which is to effectively manage the tourism sector at various levels of government through ef-

fective, transparent and accountable forms of coordination, cooperation to achieve goals.

12) *Control and monitoring mechanisms.* The reality of gastronomic tourism is complex, dynamic and changing, but very competitive. As with other types of tourism, technological, social, economic and political factors are causing changes in both tastes and habits of consumers and in the competitiveness of regions, forcing them and their businesses to transform and adapt their strategies. For this reason, good management of gastronomic tourism should include an emphasis on research and the establishment of mechanisms to control and monitor the impact of actions taken within the framework of plans, trends and competitors. In this context, monitoring and benchmarking of gastronomic tourism are key activities.

This methodology for the development of gastronomic tourism offers a path for the development of a gastronomic tourism market that must be flexible and will adapt over time. In addition, an important condition for implementation is coordination with representatives of gastronomic tourism in the region.

If we talk about our region, then Bashkiria is known for its honey, kumys - this is where the knowledge of the gastronomy of the Republic of Bashkortostan for tourists ends. As such, gastronomic tourism in the republic is poorly developed, however, the beginning of the development of gastronomic tourism in Ufa has already been laid.

So, on November 14, 2020, the first gastronomic tour called "Aksakov's Saturdays" was launched. The organizers were the Association of culinary specialists, restaurateurs and hoteliers of the Republic of Bashkortostan and the National Union of the Hospitality Industry.

The purpose of the event is to get acquainted with the traditions of hospitality, culture and customs, the peculiarities of the production of products and the preparation of national dishes of the Republic of Bashkortostan, as well as the establishment of partnerships between tour operators and restaurateurs of the region.

The tour program includes tasting of traditional dishes and merchant treats of the S.T. Aksakov, prepared by the chefs of Ufa restaurants. At the event, you can taste the dishes of Bashkir cuisine, but only in a modern interpretation with the addition of herbs and spices.

Still, it should be recognized that the gastronomic tourism of the Republic of Bashkortostan and Russia is generally underdeveloped and needs to develop and introduce new, national enterprises using modern trends. We think that the UNWTO's gastronomic tourism development methodology will increase the number of gastronomic tourists and improve the state of gastronomic tourism in the region.

Gastronomic tourism is based on the concept of knowing and learning about food, tasting and enjoying the gastronomic culture that is identified with the territory. However, the culinary identity should be noted as a distinctive feature, since

the territory is the basis of gastronomy, because landscapes, culture, products, methods and local dishes are the basis and should be part of the tourism experience offered to visitors.

Based on the above, it can be concluded that gastronomic tourism promotes, including the ethical and sustainable values of the country, the maintenance and preservation of local traditions and territory, landscape, local history, values and diversity, as well as the use and promotion of identity. Some countries use their unique cuisine in order to create a regional brand, and the methodology for the development of gastronomic tourism in the regions provides a better basis for the development of gastronomic tourism in the region and a model for public and private participation in decision-making and policy making processes leading to the development, management and promotion of gastronomic tourism.

References

1. Pulido-Fernandez J. La cadena de valor del destino como herrami entainnova dora para el analisis de la sostenibilidad de laspoliticasturisticas/J. Pulido-Fernandez // El caso de Espana. – 2016. – Vol. 26 (59). – P. 155–175.

2. Rachao S. Food tourism and regional development: a systematic literature review/S. Rachao //European Journal of Tourism Research. – 2019. – Vol. 21. – P. 33–49.

3. Predictive assessment of the development of the public catering market in 2019 [Electronic resource]. - URL: http://edrj.ru/article/16-03-2019 (date of access: 19.05.2021).

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OCCUPATIONAL PATHOLOGIES AND PERSONAL IDENTIFICATION

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Abstract. *The article deals with the application of factual data on occupational pathologies to resolve issues of personal identification. It is postulated that the signs of occupational diseases find their external expression on the skin and skin derivatives, and also lead to pathological changes in the normal course of physiological processes. This makes it possible to apply data on occupational pathologies to solve problems of forensic identification.*

Keywords: *criminalistics, forensic examination, identification, unidentified corpse, professional pathologies.*

No less valuable identification and diagnostic information can be obtained by studying the type of occupation (activity) of the identified person. When carrying out work, a person comes into contact with various tools. A person's labor activity takes place under various working conditions. This leads to the appearance of various signs that find their expression both on the surface of the skin and in morphological changes of internal organs.

Such changes can be both physiological and pathological in nature. In the latter case, they talk about occupational diseases. If the changes are physiological, then these are professional signs.

At the same time, occupational diseases should be considered those in the development of which the main role belongs to production factors.

Occupational diseases are a valuable material for conducting identification research.

From the point of view of forensic identification, occupational diseases and their signs that have developed on the basis of physical, chemical and mechanical factors should be recognized as the most informative.

The influence of mechanical factors leads to the formation of identification and diagnostic signs on the exposed parts of the body (hands, face).

Currently, the following classification of signs of occupational diseases can be used for identification purposes:

a) staining, which is a consequence of the penetration of coloring substances into the stratum corneum of the skin;

b) deposits of various substances on the skin;

c) cracks and abrasions;

d) bone changes as a result of mechanical and chemical influences;

e) pigmentation due to increased deposition of pigment;

f) homozolennosti;

g) scars and atrophy;

h) implants and tattoos.

When conducting an external examination of a corpse or examining a living person, in order to identify professional signs, attention should be paid to the exposed parts of the body, the parts directly in contact with the instrument or device.

However, to identify them, it is necessary to have special knowledge in the field of medicine, treatment of occupational diseases. Therefore, for the production of investigative actions aimed at establishing the identity, it is advisable to resort to the help of a specialist.

Numerous well-known occupational diseases are caused by a variety of chemical factors that have a selective effect on the entire body, organ systems and individual organs: heart, lungs, kidneys, liver, etc.

In this connection, V. V. Chochlov rightly points out that «... there are no poisons with a strictly isolated localization of action, each poison acts on the entire body, but its stronger selective effect affects some organs and even entire systems»[1].

This effect can be detected by a thorough internal examination of the corpse. The algorithm for examining the corpse is spelled out in detail in the order of the Ministry of Health and Social Development of 12.05.2010 No. 346n «On approval of the procedure for organizing and conducting forensic medical examinations in state forensic expert institutions of the Russian Federation»[2] and other departmental normative legal acts.

Pathological changes in the tissues of the bronchi also occur with the direct effect of the intoxicant on the peribronchial tissue. This makes it possible for a forensic medical expert to put forward a version that chronic bronchitis developed as a result of exposure to a toxic substance.

Dust in the air of workshops, mines, enterprises often leads to the emergence and development of such occupational diseases as pneumoconiosis. One of the

[1]Hohlov V. V., Andrejkin A. B. Sudebnaya medicina. Moskva, 2019. p. 2.

[2]Ob utverzhdenii poryadka organizacii i proizvodstva sudebno-medicinskih ekspertiz v gosudarstvennyh sudebno-ekspertnyh uchrezhdeniyah Rossijskoj Federacii : prikaz Minzdravsocrazvitiya ot 12 maya 2010 g. № 346 n. Dostup iz spravochno-pravovoj sistemy «Konsul'tantPlyus». Tekst elektronnyj.

manifestations of pneumoconiosis is the progressive development of lung fibrosis.

The most common of all pneumoconioses is silicosis. This disease develops when silica (silicon dioxide) is in the air. Silicosis can be found in workers engaged in stone processing, grinding, molding in the mining, foundry, ceramic industry.

The pathomorphological picture of changes in the lung tissue is quite diverse. The pathogenesis is determined by the type of dust, the duration of its inhalation and the individual characteristics of the patient's body. In medical science, it is customary to distinguish three stages of the clinical course of silicosis, depending on the data of clinical X-ray analysis: silicosis of the I, II, III stages. Such a classification can be quite correctly applied to solve issues related to identification.

The determining factor in the development of this disease is the type of inhaled dust. The most dangerous is the inhalation of asbestos and talc dust, since this chemical compound contains the largest amount of carbon dioxide. The values of dust grains (its dispersion), its concentration in the inhaled air, the duration of inhalation, the age of the employee are also important (the development of silicosis in young people proceeds more rapidly).

During the X-ray examination, characteristic changes in the lung tissue are revealed in the form of compaction of the walls of the bronchi, splitting and compaction of the roots of the lungs, strengthening of the pulmonary pattern, the appearance of additional shadows.

When inhaling coal dust, anthracosis develops. In medical science and practice, there are two groups of patients employed in the coal industry:

- the first group consists of sinkers. They most often develop silico-anthracosis, since the occurrence of coals is observed in the rocks of siliceous sandstone. During its processing, quartz dust is formed;

– the second group is formed by miners, drivers of mining machines and mechanisms. They have contact with black coal dust, so they most often have pure anthracoses.

Another type of pneumoconiosis is siderosis. It develops when inhaling dust that has iron in its composition. It is observed in persons engaged in the extraction of red ironstone, foundry workers of blast furnaces, processing (grinding and polishing of metal).

Bissinosis occurs in people engaged in cotton production. Cotton dust has a very complex chemical composition. It contains substances of organic and inorganic origin. With an increase in the quality of cotton, the content of proteins in its dust increases. Its specific gravity is not high, the size is about one micron. This is explained by the penetration of dust deep into the lungs up to the alveoli. In clinical laboratory studies of the sputum of patients with bissinosis, cotton fibers are found in the sputum.

It is not possible to fully describe the clinical picture of the manifestation of

pneumoconiosis within the framework of this textbook. We believe that this is not necessary. We will only point out that in order to solve the problems of forensic identification of an individual, it is necessary to carefully examine the skin during an external examination of a corpse and pay close attention to morphological changes in internal organs. It is important to establish and evaluate the relationship of the pathomorphological changes that have arisen with the features of the professional activity of the person whose identity is being established.Among occupational diseases, a significant place is occupied by bronchopulmonary diseases of toxic and chemical etiology. These include bronchitis, bronchiolitis, pneumosclerosis, pneumonia, pulmonary edema.

The degree of damage in this case directly depends on the concentration of the harmful substance in the air, the duration of inhalation and the general condition of the body. When establishing an identity, cases of prolonged inhalation of a toxic substance of a small concentration, leading to the development of chronic diseases, are of particular interest.

Prolonged industrial intoxication leads to the development of occupational hepatitis. All hepatotropic poisons can lead to the development of dystrophic changes in liver parenchyma cells, including massive and submassive liver cirrhosis. There may be pathologies of the biliary tract: edema of the walls of the gallbladder, fullness of the serous membrane.

The group of occupational diseases includes pathologies of the kidneys and urinary tract. However, only bladder tumors are considered occupational diseases.

Dust in the air of workshops, mines, enterprises often leads to the emergence and development of such occupational diseases as pneumoconiosis. One of the manifestations of pneumoconiosis is the progressive development of lung fibrosis.

Among the occupational hazards, the traces of which have forensic significance, it is necessary to take into account the following:

It is not possible to fully describe the clinical picture of the manifestation of pneumoconiosis within the framework of this article. We believe that this is not necessary. We will only point out that in order to solve the problems of forensic identification of an individual, it is necessary to carefully examine the skin during an external examination of a corpse and pay close attention to morphological changes in internal organs. It is important to establish and evaluate the relationship of the pathomorphological changes that have arisen with the features of the professional activity of the person whose identity is being established.

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NEW IN THE REGULATION OF THE OBLIGATIONS OF SUBSOIL USERS FOR "COMPENSATORY" REFORESTATION (AFFORESTATION)

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Abstract*. The article examines the legal problems of forest production for the construction, reconstruction, operation of linear objects, as well as the latest changes in the forestry sector in the field of rights.*

Keywords: *forest, reforestation, afforestation, forestry projects. climate change, subsoil use.*

Russia's forests are of global importance due to their colossal size, enormous carbon potential, biodiversity and forest resources (both wood and non-wood). In addition, the forestry sector of the economy is of great national importance, as it provides a significant share of GDP, export earnings and employment. A rich history of forest management has made Russia one of the leaders in forest conservation, research and development.

In the history of forestry, Peter I can be considered the founder of almost all branches of the timber industry and forestry. It is generally accepted that it was at that time that the key principle of constant and inexhaustible use of the forest was laid - the basis of modern forestry. In the 18th century, a German Ferdinand Vokel was invited to Russia, who created the first forest plantation in the country. After Fokel's death, a manuscript of the book "Description of the natural state of forests growing in the northern Russian countries with various notes and instructions on how to plant" remained, where the forester tells about the differences in climatic conditions of the Russian north and their impact on forest crops and forestry methods.

So, nowadays, Federal Law № 212-FZ of 19.07.2018 "On Amendments to the Forest Code of the Russian Federation and certain legislative acts of the Russian Federation in terms of improving forest reproduction and afforestation"[1] (here-

1 Federal Law of 19.07.2018 № 212-FZ "On Amendments to the Forest Code of the Russian Federation and certain legislative acts of the Russian Federation in terms of improving forest reproduction and afforestation" // SPS "Consultant-Plus"

inafter - Federal Law No. 212-FZ), which entered into force on 01.01.2019, a duty was established for tenants of forest plots using forests in accordance with Articles 43-46 of the Forest Code of the Russian Federation of 04.12.2006 № 200-FZ[2] (hereinafter - Forest Code of the Russian Federation), including for the construction, reconstruction, operation of linear facilities, to carry out reforestation (afforestation) on an area equal to the area of felled forest plantations, no later than one year after the felling of the forest, within the boundaries of the territory of the relevant subject[3].

In the literature, this norm is assessed from a positive point of view as aimed at improving the quality of forests[4],[5],.

Prior to the adoption of Federal Law № 212-FZ, work on reforestation (afforestation) was carried out by state authorities, local self-government bodies within the limits of their powers[6].

Based on the structure of the Forest Code of the Russian Federation itself, one of its chapters is devoted to the reproduction of forests and afforestation, built on the principles of protection, protection and reproduction of forests, laid down in Soviet times[7]. This institution includes forest seed production, reforestation, forest care, the implementation of the assignment of lands intended for reforestation to the lands on which forests are located, as well as afforestation.

It is necessary to distinguish between the concepts of reforestation and afforestation. According to Article 62 of the Forest Code of the Russian Federation, reforestation is carried out in a natural, artificial or combined way in order to restore felled, dead, damaged forests, as well as to preserve the useful functions of forests, their biological diversity. At the same time, according to Article 63 of the Forest Code of the Russian Federation, afforestation is carried out on lands of the forest fund and on lands of other categories in order to prevent soil erosion and other purposes related to increasing the potential of forests.

The procedure for performing work by artificial and combined methods for certain categories of persons, including for subsoil users, was approved by the Decree of the Government of the Russian Federation dated 05.07.2019 № 566 "On approval of the Rules for the performance of work on reforestation or afforestation by persons using forests in accordance with Articles 43 - 46 Of the Forest

2 Forest Code of the Russian Federation of 04.12.2006 № 200-FZ // SPS "Consultant-Plus"

3 Ignatieva I.A. The use of land and land plots with electric power facilities: law and practice: a tutorial. M.: Prospect, 2019. 368 P. // SPS "Consultant-Plus"

4 Akopdzhanova M.O. Modern forestry legislation: the history of formation, development trends and legal enforcement // Lawyer. 2019. № 9. P. 60 - 63. // SPS "Consultant-Plus"

5 Chernov S.N. Features of the development of modern forest legislation of the Russian Federation // Lawyer. 2020. № 4. P. 66 - 70. // SPS "Consultant-Plus"

6 Environmental law: textbook / O.I. Crassov. –3rd ed., rev. – M.: INFRA-M, 2014. – P. 386 -394.

7 Bogolyubov S.A. Environmental law. Textbook for universities. – M.: Publishing group NORMA-INFA M, 1999. –P. 296.

Code of the Russian Federation, and persons who have applied with a petition or application to change the designated purpose of the forest area"[8]. The reforestation project and the reforestation project are developed in accordance with the orders of the Ministry of Natural Resources of Russia dated 04.12.2020 № 1014[9] and dated 30.07.2020 № 541[10], which establish the rules for performing reforestation (afforestation) work for all categories of persons, including subsoil users.

The norm introduced by Federal Law № 212-FZ did not take into account the division of the country's territory into climatic zones[11]. O.I. Krassov once quite rightly noted that reforestation (afforestation) is carried out on a zonal-typological basis in accordance with the potential forest growing conditions of the sites, the silvicultural properties of tree and shrub species, and the goals of planting[12].

An example of a constituent entity of the Russian Federation with severe, pronounced climatic conditions, where subsoil users carry out their activities in the extraction of minerals, is the Yamalo-Nenets Autonomous Okrug (hereinafter - YNAO), which is part of the Arctic zone of the Russian Federation[13]. On the territory of YNAO there are mainly forests belonging to the zone of pre-tundra forests and sparse taiga, as well as forests of the West Siberian north-taiga plain region[14].

It is worth noting that the Arctic environment, with its fragile ecosystems, is very slow to recover from human intervention[15]. In this regard, it is worthwhile to separately approach the development of a set of measures aimed at regulating the ecosystems of this region.

The fulfillment of responsibilities for "compensatory" reforestation (affores-

8 Decree of the Government of the Russian Federation of 07.05.2019 № 566 "On approval of the Rules for the performance of work on reforestation or afforestation by persons using forests in accordance with Articles 43 - 46 of the Forest Code of the Russian Federation, and persons who have applied with a petition or application to change the designated purpose of a forest area"// SPS "Consultant-Plus"

9 Order of the Ministry of Natural Resources of Russia dated 04.12.2020 № 1014 "On approval of the Rules for reforestation, the composition of the reforestation project, the procedure for the development of the reforestation project and amending it" // SPS "Consultant-Plus"

10 Order of the Ministry of Natural Resources of Russia dated 30.07.2020 № 541 "On approval of the Rules for afforestation, the composition of the afforestation project, and the procedure for its development" // SPS "Consultant-Plus"

11 Berezhnoy V.A. Ecological and legal regime of nature management. Taxes (newspaper), 2008, № 31. // SPS "Consultant-Plus"

12 Krassov O.I. Natural Resources of Russia: Commentary on Legislation. – M.: Business, 2002. – P. 653 – 664.

13 Decree of the President of the Russian Federation of 02.05.2014 № 296 "On the land territories of the Arctic zone of the Russian Federation" // SPS "Consultant-Plus"

14 Order of the Ministry of Natural Resources of Russia dated 04.12.2020 № 1014 "On approval of the Rules for reforestation, the composition of the reforestation project, the procedure for the development of the reforestation project and amending it" // SPS "Consultant-Plus"

15 Environmental law: Textbook. – M.: ECC "Mart"; Rostov on Don: publishing center "Mart",2005. – P. 407.

tation) in YNAO is complicated by the harsh natural and climatic conditions, soil and climatic features, wetlands, inaccessibility, a short growing season, the lack of forest nurseries in the subject, planting material in the required amount, its high price and survival rate below the statutory[16] threshold of 85%, at which supplementation with forest crops is required. According to preliminary estimates, the cost of artificial reforestation in YNAO may reach 1 million rubles per 1 hectare, with the amount of 20 thousand rubles initially declared in the explanatory documents to the draft amendment to the forest code in terms of reforestation (afforestation).

For artificial and combined reforestation in the West Siberian north-taiga plain area YNAO, it is planned to use planting material that meets the criteria and requirements specified in the order of the Ministry of Natural Resources of Russia dated 04.12.2020 № 1014[17]. So, for Siberian spruce, Siberian larch, Siberian cedar pine, Scotch pine, requirements are imposed on the age of the planting material (2-4 years) and (or) to the height (more than 10 cm), as well as to the diameter of the stem at the root collar (more than 2 mm). However, on the territory of YNAO, artificial reforestation has not been carried out at all since 2004, including due to the lack of permanent forest nurseries on its territory. Thus, the main way of carrying out reforestation work is natural. The choice of this method is determined by both natural and economic conditions, which is confirmed by forest management projects.

In accordance with article 87 of the Forest Code of the Russian Federation, the basis for the use, protection, protection, reproduction of forests located within the boundaries of the forestry, forest park, is the forestry regulations of the forestry[18]. Forestry regulations of YNAO forestries (Nadym, Krasnoselkupsky, Noyabrsky, Tarkosalinsky) for the period 2019-2028 provide a natural way of reforestation[19].

Natural reforestation is carried out with uniform conservation and in a sufficient amount of undamaged undergrowth of economically valuable species, as well as sources of seeding[20]. When using this method, there is no need for transportation and supplementation with artificially grown planting material. A feature of the process of reforestation in the zone of pre-tundra forests growing in

16 Order of the Ministry of Natural Resources of Russia dated 04.12.2020 № 1014 "On approval of the Rules for reforestation, the composition of the reforestation project, the procedure for the development of the reforestation project and amending it" // SPS "Consultant-Plus"

17 Order of the Ministry of Natural Resources of Russia dated 04.12.2020 № 1014 "On approval of the Rules for reforestation, the composition of the reforestation project, the procedure for the development of the reforestation project and amending it" // SPS "Consultant-Plu"s

18 Dobrovolsky A.A. Features of the development of design documentation for forest areas transferred for use // Environmental Law. 2017. № 4. P. 38 - 40. // SPS "Consultant-Plus"

19 https://dprr.yanao.ru/activity/3283/

20 Krassov O.I. Natural Resources of Russia: Commentary on Legislation. – M.: Business, 2002. – 816 P.

extreme climatic conditions in the presence of permafrost is its duration. At the initial stage of reforestation, deciduous species appear and only after 3-5 years - conifers, which have real value (pine). In general, the process of formation of the coniferous massif ends in 20-25 years.

Federal Law № 212-FZ provides for work on "compensatory" reforestation (afforestation), initially without taking into account the peculiarities of various natural and climatic zones, and also imposing on subsoil users the obligation to carry out non-core work, the quality of which depends on the conscientiousness of the contractors, and their control goes beyond the competence of subsoil users.

In July 2021, Federal Law № 303-FZ dated 02.07.2021 "On Amendments to the Forest Code of the Russian Federation and Certain Legislative Acts of the Russian Federation"[21] (hereinafter - the Law) was adopted, which implies another fundamental revision of the forestry institute, which will result in another significant deterioration the position of subsoil users by increasing the scope of obligations, a significant increase in cash costs.

Initially, his idea was only to increase the deadlines for fulfilling obligations for "compensatory" reforestation (afforestation) from one year to three years, subject to agrotechnical maintenance of the created forest cultures within three years after their planting. Subsequently, the Law was supplemented with a number of norms.

According to the statement of the Deputy Chairman of the Government of the Russian Federation V.V. Abramchenko "with the adoption of the bill, business representatives who do not have sufficient resources or competencies to carry out reforestation will be able to order such turnkey work from regional forestries"[22]. Thus, the Law was supplemented with a number of norms providing for work on reforestation (afforestation) with the involvement of professional executors - state (municipal) institutions.

As part of the discussion at the working groups in the Ministry of Energy of Russia and the Ministry of Natural Resources of Russia, representatives of subsoil users suggested that as a measure to encourage companies to apply for this service to professional performers, it is worthwhile to provide for the fulfillment of the obligation from the moment of payment for the services of such specialized institutions, as well as the transfer of responsibility for "compensatory" reforestation for these state (municipal) institutions. In addition, now there is a problem with the lack of a sufficient number of contractors capable of carrying out work on reforestation (afforestation), since the organizations of the fuel and energy complex cannot independently carry out such work due to the lack of relevant experience and competence. The remark was taken into account when finalizing the Law for

21 Federal Law of 02.07.2021 № 303-FZ "On Amendments to the Forest Code of the Russian Federation and Certain Legislative Acts of the Russian Federation" // SPS "Consultant-Plus"

22 http://government.ru/news/41052/

the second reading.

Another idea for finalizing the Law for the second reading was to replace the obligation of subsoil users to perform these works in kind with the payment of compensation payments for the implementation of measures for the protection, protection, reproduction of forests to the relevant state authorities of the constituent entity of the Russian Federation. The payment was supposed to be included in the form of an additional coefficient when calculating the rent for the forest area. This approach would allow reforming the forestry sector at the expense of business funds, attracting highly qualified forestry specialists to serve in the forestry sector. However, the Ministry of Natural Resources of Russia did not support the initiative due to the fact that these funds could only go to the federal budget, and forest plots are in federal ownership[23]. In order to lower these funds to the level of the budget of the constituent entities, it is necessary to "paint" them, for which it is necessary to develop and approve an appropriate methodology.

The subsoil is also provided for geological study, including the search and assessment of mineral deposits[24]. Subsoil users carry out geological study of the subsoil by seismic studies on profiles reaching several hundred kilometers in length. A seismic profile or profile is a clearing, along which equipment is installed for carrying out work on the search for minerals (usually its width is limited to 4 meters)[25]. For this purpose, felling of forest stands is carried out on these seismic profiles.

An acute problem for subsoil users has become the obligation to carry out work on "compensatory" reforestation (afforestation) on such seismic lines. Earlier, the Ministry of Natural Resources of Russia initiated amendments to the Decree of the Government of the Russian Federation dated 07.05.2019 № 566, providing for the possibility of carrying out reforestation in a natural way on seismic profiles. Seismic surveys in YNAO are carried out in winter on narrow seismic profiles (3-4 m) in the presence of a stable snow cover, which provides a minimum negative impact on the forest biocenosis with the preservation of the ground cover and undergrowth that can form a new stand. Under these conditions, it is sufficient to carry out work on reforestation in a natural way. The law excluded this possibility. As mentioned above, the low survival rate in the Arctic region has shown that the natural method is optimal for these territories. When the Law was finalized for the second reading, the work on reforestation on seismic profiles was provided in a natural way.

One of the ideas on how to avoid the influence of the harsh climatic conditions

23 Gulov E.A. Ensuring the safety of forest lands by means of prosecutor's intervention // Legality. 2019. N 8. P. 21 - 23. // SPS "Consultant-Plus"

24 Bogolyubov S.A. Environmental law. Textbook for universities. – M.: Publishing group NORMA-INFA M, 1999. – P. 259.

25 https://greenpeace.ru/stories/2018/11/21/nam-ot-nefti-nichego-odni-problemy/

of the north was the opportunity to change the norm of the Forest Code of the Russian Federation and go beyond the boundaries of the subject where the felling was carried out. The law provides for work on reforestation (afforestation) outside the constituent entity of the Russian Federation, where felling was carried out, if there are no lands in it that need reforestation (afforestation). Firstly, the norm contains an evaluation criterion, it is not clear on what principle and who should determine the assignment of certain lands to those in need of reforestation (afforestation). Secondly, not all business representatives have their branches outside the region in which the company operates, including in the southern regions of the country. Thirdly, the implementation of reforestation (afforestation) outside the location and implementation of the company's activities entails an unreasonable rise in the cost of the projects being implemented. Fourthly, the constituent entities of the Russian Federation, forest nurseries are unlikely to support such an obvious "bias" in reforestation in the southern regions, where reforestation is cheaper and easier to carry out. At the same time, the aforementioned norm was not excluded from the text of the Law when it was finalized for the second reading.

The controversial norm included in the Law was an increase in the terms of fulfilling obligations for "compensatory" reforestation (afforestation) from one year to three years, provided that agrotechnical measures were carried out during this period.

Under the influence of harsh climatic conditions, the death of forest crops will increase over the established three years, especially in winter. The fulfillment of obligations on “compensatory” reforestation is made dependent on climatic risks that cannot be managed. In addition, the addition of forest crops to replace those killed in the specified period and the implementation of agrotechnical measures will significantly increase the costs of subsoil users, regardless of the quality of such work, will entail the emergence of additional administrative barriers, and also once again force the business to engage in non-core activities.

Chapter 4 of the Forest Code of the Russian Federation "Forest reproduction and afforestation" retains its original approach and does not make adjustments to the subject composition. In the articles of this chapter, the main subjects of activity are loggers, as well as other business representatives (subsoil users, etc.). Their status and conditions of work, laid down in the norms on forest reproduction, are equated, but the approach seems to be incorrect. Loggers receive a plot of land for lease, perform felling on it, and reforestation on the same plot. Subsoil users, on the other hand, cut forest plantations on the leased plot and do not carry out reforestation work on the same plot. To fulfill their obligations on "compensatory" reforestation, they choose on the website Information about the specified lands intended for artificial reforestation is posted by the authorized body on its official website in the information and telecommunication network "Internet" in accord-

ance with Part 3 of Article 5.1 of the Forest Code of the Russian Federation.

Thus, in this case, even their original goals diverge. It is important for loggers to get a plot with a high bonitet of forest plantations growing on it, they are interested in the high quality of the timber obtained, which is almost absent in the territory of YNAO. Moreover, loggers perform felling taking into account the preservation of individual trees, contributing to subsequent seeding. Subsoil users lease a site for the purpose of erecting structures (buildings, linear objects) on it, conducting geological studies and do not pursue the goal of curing any benefit from the wood obtained during felling.

In connection with the work carried out by subsoil users on reforestation (afforestation) not on the site originally leased, it is advisable to establish the legal basis for the use of forest plots when carrying out reforestation (afforestation) work, since the Forest Code of the Russian Federation does not provide for the use of forest plots in the form of reforestation (afforestation).

The law stipulates that failure to fulfill the reforestation (afforestation) project entails termination of the lease agreement for the forest plot. At the same time, the Ministry of Natural Resources of Russia has prepared a draft federal law "On Amendments to Article 74.1 of the Forest Code of the Russian Federation"[26], in which one of the grounds for terminating the lease agreement is the lessee's failure to fulfill the forest reproduction measures envisaged by the forest development project, or their implementation in volumes less than 50% for three consecutive years. The norms of these acts do not correspond to each other. They worsen the situation of subsoil users, since the executive authorities of the constituent entities of the Russian Federation have the opportunity to terminate the lease only on the basis of failure to fulfill one of the activities of the reforestation (afforestation) project. This approach entails the risks of suspending the activities of subsoil users for geological study, exploration and production of subsoil. At the same time, the grounds for termination of the lease agreement are already provided for in the Forest Code of the Russian Federation[27], thus, the introduction of this norm will be redundant and will entail the emergence of a legal conflict.

The norms of the Law stipulate, as a result of the work carried out, "the assignment of lands on which artificial reforestation is carried out to the lands on which forests are located." This means that the responsibility of subsoil users extends over a long period of 10-20 years, and the responsibility for reforestation must be fulfilled within a year. Therefore, the given period is not justified, as a possible adjustment to the norm, it was proposed to consider the obligations of subsoil users for reforestation fulfilled if the parameters established in the reforestation project agreed with the authorized bodies of state power and local self-government were

26 https://regulation.gov.ru/projects#npa=112736

27 Olenina T.Yu. The right to free use of a forest area // Environmental Law. 2019. № 4. P. 21 - 23. // SPS "Consultant-Plus"

achieved. However, the norm was not adjusted following the completion of the Law for the second reading.

Thus, the most acceptable way to solve some problems related to the obligations of subsoil users and their status in relations regulated by the Forest Code of the Russian Federation is to create a separate chapter in the Forest Code of the Russian Federation that regulates the specifics of the status of subsoil users.

One of the measures stimulating subsoil users to carry out work on reforestation (afforestation) could be the support of significant long-term investments of forest users, in particular, a decrease in rental payments for high-quality restored forest areas, a proportional increase in the permitted volume of forest use, etc.[28] In addition, reforestation projects voluntarily implemented by companies should be encouraged.

28 https://lesprominform.ru/media/_protected/journals_pdf/14786/lpi_142.pdf

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UNIFIED EDUCATIONAL ENVIRONMENT AND UNIVERSITY ECOSYSTEM AS THE BASIS FOR THE FORMATION OF PATRIOTISM TAKING INTO ACCOUNT CIVIC IDENTITY IN A MODERN FAMILY

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Abstract. *The article examines the conceptual foundations of moral ecology and proposes the practice of implementing the problems of creating a single educational space for a university on the example of FSBEI HE "Shukshin Altay State University for Humanities and Pedagogy" (Biysk, Altai Territory, Russia). The features of the university ecosystem, which includes this educational space, are described. It also presents the results of using the ecosystem and a single educational space as the basis for the formation of patriotism, taking into account the civic identity of students in a modern family. The formation of students' patriotism was chosen as the main direction of the research.*

Keywords**:** *unified educational space, university ecosystem, patriotism, civic identity, modern family, students.*

Introduction

The creation of a single educational space that unites all the resources of educational organizations and social space for solving educational goals in each region is currently one of the most significant tasks of society and the state. At the same time, the formation of patriotism in such a space, taking into account civic identity, is rooted in the modern family, interaction with which should also become one of the mandatory components of a single educational space.

The relevance of the topic we are considering is confirmed by the amendments to the Federal Law "On Education in the Russian Federation" on the education of

students, introduced on July 31, 2020 [1].

V.M. Shukshin Altay State University for Humanities and Pedagogy (hereinafter referred to as the Shukshin University) always responds to the challenges of the time and immediately set about solving the problems in the field of education set for educational organizations of various levels. Taking responsibility for the fulfillment of the most important task of education, which is considered as an activity aimed at developing the personality and creating conditions for self-determination and socialization of students, Shukshin University took under special control the solution to the problem of developing and improving educational activities and creating an educational space as in the university itself, and a single educational space in the tandem "university - schools of the Biysk educational district" [2].

As Academician D.S. Likhachev: "Love for the native land, for the native culture, for the native village or city, for the native speech begins with small things - with love for your family, for your home, for your school. Gradually expanding, this love for one's family turns into love for one's country - for its history, its past and present, and then for all of humanity, for human culture"[3, p. 401]. At the same time, the author believed that in education it is impossible to exclude the unity of the people, nature and culture. Therefore, we have no doubt that the achievements of science, which deals with the protection and restoration of the surrounding nature and is called "ecology", helped us to create an ecosystem at Shukshin University. The university ecosystem has created an educational and upbringing space through environmental laws that make it possible to realize the ecology of the educational environment as a comfortable, expediently organized space that ensures the implementation of all educational and educational tasks [4].

When creating the ecosystem of Shukshin University, including a single educational space, we were guided by the recommendations of Academician D.S. Likhachev, who believed that: "… Ecology cannot be limited only by the tasks of preserving the natural biological environment. For a person's life, the environment created by the culture of his ancestors and himself is no less important. The preservation of the cultural environment is a task no less important than the preservation of the surrounding nature. If nature is necessary for a person for his biological life, then the cultural environment is just as necessary for his spiritual, moral life, for his "spiritual settledness", for his attachment to his native places, for his moral self-discipline and sociality. Meanwhile, the issue of moral ecology is not only not studied, it is not even posed by our science as something whole and vitally important for a person"[3, p. 418-419]. From this statement, we can draw a conclusion about the need for research in the field of moral ecology, which, in our opinion, should include such spiritual and moral components as patriotism, civic identity, as well as the peculiarities of their formation in the interaction "family - society - educational organization (preschool institution, school, college, university, institutions of additional education)".

Purpose of the study – it is the identification of the conceptual foundations of moral ecology, the practical transformation of the university ecosystem and the construction of a single educational space in it for the formation of patriotism, taking into account the civic identity of students in a modern family.

Materials and methods

With the financial support of the Ministry of Education of the Russian Federation within the framework of the state assignment for the implementation of research work on the topic "Civic identity of adolescents in a modern family: conceptual foundations and the formation of patriotism in the context of various ethnic cultures and regions" within the framework of the Program of fundamental scientific research in the Russian Federation for a long-term period (2021-2030) (Internet topic number 1321083015652-9) Shukshin University began researching not only the fundamental foundations of this scientific direction, but also began to transform the university ecosystem. The ecosystem needed to be changed in terms of design in a single educational space of the direction associated with its filling with tools and platforms, including digital ones, which will ensure interaction with the family and help not only to identify civic identity among students, but also to form patriotism, taking into account their identity.

Given the multidimensionality and versatility of our goal, we considered it necessary to present the basic definitions of this part of the study to ensure the unity of the conceptual and terminological field.

Patriotism (from the Greek πατριώτης - "compatriot", πατρίς - "fatherland") is a kind of political principle, a social feeling, the content of which is love, attachment to the Motherland, devotion to it and readiness for any sacrifices for its sake [5, p. 164]. Identity is a property of the human psyche in a concentrated form to express for him how he imagines his belonging to a particular group or community [5]. Civil identity is a person's awareness of his belonging to the community of citizens of a particular state, participation in the social and political life of the country, which is very significant for the individual; is based on the sign of a civic community, which characterizes civic identity as a collective entity [6]. The definition of "civic identity" should be distinguished from the idea of "citizenship", where the individual acts as the bearer of certain political rights and freedoms, and also has responsibilities in relation to the state, i.e. citizenship itself is rather a formal legal status of an individual and its difference from non-citizens of a particular state [7]. Civil identity is one of the components of a person's social identity. Along with civic identity, in the process of personality formation, other types of social identity are formed - gender, age, ethnic, religious, professional, political, etc. [8]. The modern family is an institutionalized community formed on the basis of marriage and the resulting legal and moral responsibility of spouses for the health of children and their upbringing [9, p. 57]. We presented the definitions we

have chosen, since they are incorporated into the stages we describe in creating the ecosystem of the Shukshin University, the integrated educational space included in it, and filling the system of forming students' patriotism.

The basis for the creation of the ecosystem of Shukshin University was the "spinning top of life", which provides life in the natural ecosystem. Sustainable evolution of the natural "spinning top of life" is ensured by flows of energy in the form of solar heat and light, flows of matter in the form of biomass and flows of information that provide informational communication of all living and non-living things in the biosphere. In this case, the flows of matter and energy in the biosphere are inseparably connected with the flows of information. Scientists suggest that the ability to perceive, accumulate and use information is one of the most important features of living matter [4]. This means that in order for the university ecosystem to ensure the ecologization and continuous evolution of the educational and educational environment, analogs of energy, substance and information flows are needed to ensure the life of an educational organization, its connection with external social and socio-professional spheres of society, similar to natural ones.

The scientific school of Shukshin University identified the main flows of energy, matter and information necessary for the effective functioning of the educational ecosystem. Research conducted at the university has shown that in the educational ecosystem, energy sources are virtual sources of local storage of the university and energy reserves in virtual cloud storage. For the educational ecosystem, the transition of energy support is provided, which came from virtual sources and supplemented with the energy of value-semantic, motivational and psychological-pedagogical support [10]. In this educational ecosystem, there is a constant exchange of energy and material components between participants in educational activities. Material sources of development and successful functioning of an educational ecosystem are similar to the flows of matter in a natural ecosystem. Material support, similar to the flows of matter in the natural system, is formed on the basis of the psychological and pedagogical foundations of didactics, which make it possible to form ecologically sound, psycho-pedagogically verified educational and educational content in the educational ecosystem as a structured subject content used in the educational process [4]. However, efficiency, continuous movement, development, evolution in the educational ecosystem of the university is impossible without the transfer of information. The provision of information flows in the educational ecosystem occurs through the interaction of all information communication channels - digital and robotic tools (platforms, portals, sites, etc.) located in the electronic information educational environment (EIEE) of the university. Thus, the ecosystem operating at the university has every reason to include in it a single educational space as the basis for the formation of patriotism, taking into account the civic identity of students. The university ecosystem has:

- within the educational and educational space: virtual sources of the local network of the university and sources of virtual cloud storage, providing value-semantic, motivational and psychological-pedagogical support;

- at EIEE University: educational content, developments in the field of psychological and pedagogical foundations of didactics;

- in the information support of all areas of interaction, the distribution of information flows, the accumulation and processing of information: electronic, digital and robotic tools, platforms, portals, etc., contributing to the effectiveness of a single educational space.

Results and discussion

The conceptual foundations of creating a single educational space based on the university ecosystem, if it is used to form patriotism, taking into account the civic identity of students in a modern family, we consider a set of methodological and technological ideas (foundations) that ensure its structural, procedural and content specificity.

The main methodological ideas that formed the basis of a unified educational space are: theory of self-organization, synthesis of evolving structures into one complex structure, ideas of cooperation pedagogy, pedagogy of humanism, common care, a single educational and developmental space, multidimensionality and diversity of socialization fields as components of the educational space, the unity of the educational environment in a modern family [11]. The basic technological ideas of a single educational space are the ideas of using innovative educational technologies, including traditional educational practices, as well as electronic, digital, robotic elements that provide a variety of interactions. At the same time, by the technology of education, we mean a system of methods, techniques, and procedures of educational activity developed by science and selected by practice, which allow it to appear at the level of mastery and guarantee the reproducibility and quality of results [12].

Structural and procedural specificity is expressed by the fact that all traditional structural components of the pedagogical educational process (taxonomy of goals and objectives, forms, methods and means) are present in a single educational space. However, the structure includes modern electronic, digital and robotic elements of interactions (university - educational organizations (schools, colleges); teachers - students; students - schoolchildren (college students) - educational organizations; university - parents; educational organizations - parents, etc.). The procedural orientation of these innovative elements is determined not only by socially and socially significant goals, but also by personal goals, motives, and needs of the subjects. The specificity of the procedural component is the organization of practical educational work to ensure the result of joint activities of all subjects (participants in interactions) in a single educational space in several aspects:

- firstly, the specific actions and operations of the participants in the interactions that they perform in everyday life and communication;

- secondly, the processes of controlled interactions provided by an innovative digital educational environment (EIEE of the university and educational organizations, information capabilities of the Internet and social networks, specially created platforms and sites, etc..);

- thirdly, the actions, deeds, behavior of the pupil in the process of mastering spiritual knowledge, the formation of moral skills, habits and skills that ensure the formation of patriotism, taking into account personal characteristics, including civic identity formed in the family.

The content specificity of a single educational space provides in the content component of education the presence in the educational and educational content of a set of materials that ensure the formation of ideas, concepts, judgments and values of a patriotic orientation [13]. Also, the content specificity of the unified educational space of the university provides such content of the educational process, which is conditioned, on the one hand, by the goals and interests of specific activities and the formation of a personality endowed with universal human values, and, on the other hand, by the formation of a citizen and patriot of their homeland.

A generalization of the above in the form of a graphic image of a single educational space is shown in figure 1 (see next page).

On the basis of a graphic representation of the structural, procedural and content components of a single educational space, presented in figure 1, it is necessary to fill each component with specific content, forms, methods, means, as well as technologies for the formation of patriotism, taking into account the civic identity of students in a modern family.

At the same time, the further activities of the scientific school of Shukshin University are also represented by a professional management component, which ensures the effectiveness of the creation and application in a single educational space of the university: a single educational and educational content of a patriotic orientation; structures of interactions aimed at fostering patriotism; digital information educational environment; as well as structures and processes that provide both direct interaction with families: "university - family", and mediated: "university - school (teacher, psychologist, sociologist, etc.) - family."

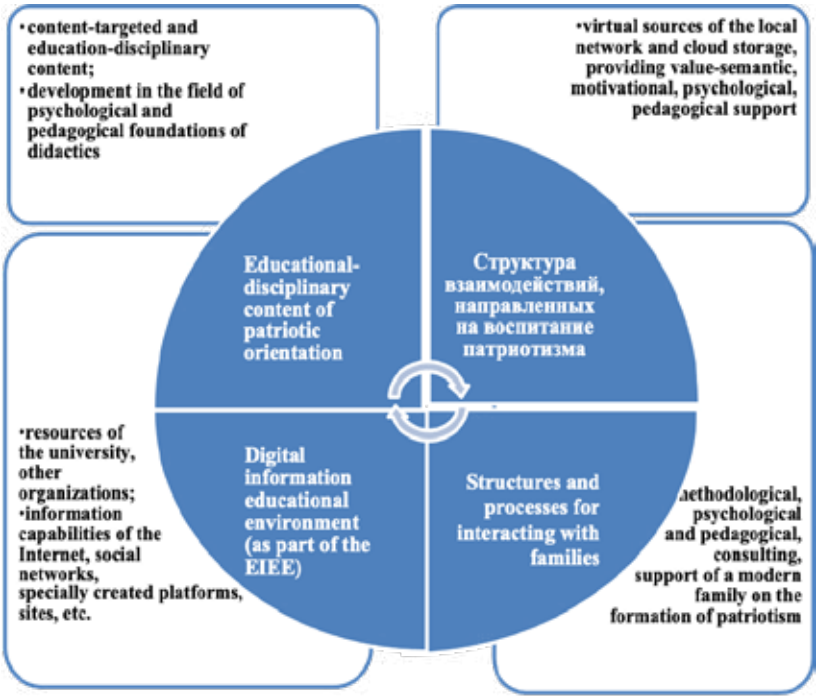

Figure 1. Structural, procedural and content components of a single educational space aimed at the formation of patriotism, taking into account the civic identity of students in a modern family

Conclusion

All these digital tools provide consistent, dynamic, pedagogically predictable progress towards relatively new, creative in spirit, innovative educational results in the field of patriotism formation. To achieve the goal that ensures the formation of patriotism, taking into account the civil identity of the student, formed in the family, in our opinion, is possible through a set of tasks that are constantly transforming to meet the needs of society, society, and the state. Tasks should be organizational and methodological and cover at least the following areas:

1. Creation of a system of continuous build-up of professional and methodological skills of university teachers, students, teachers and parents in terms of increasing educational professionalism in the formation of patriotism among all students, including adolescent students.

2. Creation of an integrative single educational space in the "university - edu-

cational organization - family" system that meets modern, extremely high requirements for the structure, conditions and results of education, including digital tools of interactions that contribute to the formation of patriotism.

3. Increasing the creative activity of all participants in the holistic educational process, involving them in continuously improving, meaningfully constantly updated activities within the framework of a single educational space, provided with the life of the educational and educational ecosystem of the university and electronic and digital resources EIEE, etc.

References

1. Federal Law № 273-FZ of December 29, 2012 (as amended on July 2, 2021) "On Education in the Russian Federation" (as am. and sup., entered into force on July 13, 2021). URL https://www.zakonrf.info/izmeneniya-v-zakonodatelstve/izmenenie-zakon-ob-obrazovanii-v-rf/

2. Pedagogy of the XXI century: a change of paradigms: a collective monograph in 2 volumes. Volume 1 / L.A. Mokretsova, O. V. Popova, N.V. Volkova, T.I. Gromoglasova, E.B. Manuzina, N.A. Shvets, M.V. Dovydova, E.V. Dudysheva, L.A. Romanova, T.V. Gavrutenko; gen. ed. prof. O.V. Popova; Shukshin Altay State University for Humanities and Pedagogy. Biysk: FSBEI HE «SASUHP», 2019. 396 P.

3. Likhachev D.S. Notes about Russian. Selected works in three volumes. Volume 2. M.: "Azbuka-Atticus Publishing Group" LLC, 2014. 524 P. P. 418-494.

4. Mokretsova L.A., Popova O.V. Greening the educational environment of the university: from theory to implementation strategy. The world of science, culture, education. 2019. № 3(76). P.54-56. Access: https://elibrary.ru/item.asp?id=38543447

5. Sociological encyclopedia. In 2 V. V.1. M.: Thought, 2003. 863 P.

6. Maksimova L.Yu., Ryabova I.V. Conceptualization of the phenomena of civic identity, patriotism, citizenship and civic competence as components of the civic orientation of the individual. The world of education – education in the world. 2020. № 2(78). P. 146-162.

7. Mokretsova L.A., Popova O.V. Formation of citizenship in innovative educational projects. Formation of civic identity of youth: pedagogical and management practices: collection of materials. M., 2019. 164 P. P. 54-58.

8. Maksimova S.G., Omelchenko D.A., Noyanzina O.E. Social activity and civic identity of the population as the most important characteristics of civil society in modern Siberian regions. Bulletin of the Russian Foundation for Basic Research. Humanities and social sciences. 2020. №5(102). P. 44-56.

9. Eurasian political economy: textbook. SPb.: Publishing house of SPbGEU, 2016. 767 P.

10. Mokretsova L.A., Dudysheva E.V. Building an educational ecosystem of innovations at a regional pedagogical university in the context of digitalization. Teacher of the XXI century. 2021. № 3. Part 1. P. 000–000. DOI: 10.31862/2073-9613-2021-3-000-000

11. Mokretsova, L.A., Popova, O.V., Shvets, N.A. Educational space of a pedagogical university and school: implementation practice. Pedagogical education in Russia. 2021. № 2. P. 110-117.

12. Mokretsova L.A., Popova O.V., Shvets N.A. Integration of digital resources of educational, scientific and innovative activities for the formation of the educational environment of the university. Education as a strategic national priority: materials of the international scientific and educational forum (Yekaterinburg, April 15-16, 2021) Part 2 / Ural State Pedagogical University; chief editor B.M. Igoshev. – Yekaterinburg: [b. e.], 2021. 430 P. P. 119-127.

13. German E.A. Theoretical innovation: textbook. SPb., 2018. 148 P.

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SUSTAINABILITY OF BUREAUCRATIC PRESSURE ON THE PSYCHOLOGICAL COMPONENT OF PEDAGOGICAL ACTIVITY

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Abstract. *The relevance of the authors' appeal to the problem of the sustainability of bureaucratic pressure on the right of teachers to decent work, excluding the threat of factors that damage their mental and physical health, is associated with two aspects. In the theory of sustainable development of education, a significant social institution is considered from the point of view of its task of ensuring the stability of the development of the society of the future. However, the problems of the mechanism of protection of the psychological and physical state of health of the leading subject of education - the teacher, as a rule, remain 'behind the scenes'.At the same time, there are quite a lot of publications in foreign sources about the real problems of strengthening the attack on academic rights and freedoms precisely in the research field that is lacking in national practices.*

Materials and Methods. Materials and methods: a review of analytical assessments presented in the Scopus, Web of Science, CyberLeninka, RSCI and others databases was used to apply the methodology of analysis, synthesis, generalization of the results of qualitative research of author's and secondary ones.

Results. The aim of the work is to compare the results of qualitative studies of factors that negatively affect the state of mental and physical health of teachers. The novelty of the work lies in the comparative approach to the causal relationships of the process of increasing bureaucratic pressure on the psychological stability of the academic community.Results and discussion section contains pro-

posal to unite the efforts of the academic community at the international level to protect the right of teachers to a psychologically safe and stable working environment.

Discussion and Conclusion. The study may arouse interest among the academic community, university management organizers, and representatives of public institutions developing innovations in organizing psychological support for university employees. In conclusion, the author's approach to the essence of the used concepts of "stability of the moral and psychological context of the work of teachers" is given. This will make it possible to determine further directions of analysis, synthesis and evaluation of the presented category.

Keywords: *academic community, bureaucratic pressure, psychological context of teachers' work.*

Introduction

The problem of sustainability of bureaucratic pressure on the academic community is widely debatable in the world scientific field in terms of the conflict of interests between the leading participants in the educational process. Indeed, in recent years, there have appeared various publications actively presenting not only the themes of suppression of academic rights and freedoms, but also of increasing responsibility of teachers for the results of their work (Global Forum on Academic Freedom, Institutional Autonomy, and the Future of Democracy declaration. Available at: https://rm.coe.int/global-forum-declaration-global-forum-final-21-06-19-003-/16809523e5; Thirteenth Session: Joint ILO–UNESCO Committee of Experts on the Application of the Recommendations concerning Teaching Personnel, Geneva, 1–5 October 2018, Geneva: International Labour Office, United Nations Educational, Scientific and Cultural Organization, 2019. 44 p. https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/meetingdocument/wcms_671540.pdf).

However, very few publications aim to analyze the cause-and-effect context of one of the significant problems. We are talking about the problem of destruction of stability of the moral and psychological component of work of teachers as a result of increased bureaucratic pressure. In this regard, an attempt to implement comparative approach to the results of current research can be considered as relevant. Of particular importance may be authors' attempt to comprehend the essence of the concept of "stability of the moral and psychological context of work of teachers" and its characteristics such as "stable flexibility / adaptability".

Purpose of the study - to verify the data of foreign studies with a list of problem points in the activities of teachers with the opinion of Russian colleagues. Limitations: the respondents insisted on guarantees of the survey anonymity, and

the conclusions can only indicate a certain trend in the correlation of causal contexts in Russia and abroad.

Materials and methods

Despite the fact that discussion of the problems concerning the psychological component of pedagogical activity is widely conducted among both academic experts and non-specialists, still it is somewhat one-sided. For many years already psychologists have been researching the burnout syndrome, the reasons for its manifestation in representatives of different professions and ways to overcome it (Temirov, 2011). The range of scientific developments on this narrow topic is quite diverse and has a significant time lag (Aminov, 1994; Kondrateva, 2017; Seregina, 2007, etc.). At the same time, it should be noted that there is a certain general and persistent approach of researchers: a person who has lost a state of psychological stability must diagnose his condition himself and simply start using the recommendations of scientists, for example, go in for sports (Shacz, 2017; Ivanov, 2019).

Researchers began to turn to the strata of teachers of higher education relatively recently (for example, L. I. Shcherbich together with I. I. Seregina and others).

There exist other studies (Antipina, 2017). For instance, U. D. Antipina in cooperation with her colleagues investigated the contradiction between the external requirements associated with professional status and the opportunity to get satisfaction from their work and develop. However, the scientists conclude that personal qualities of teachers to a greater extent affect the development of emotional burnout syndrome rather than organizational issues. Their work focuses on such terms and notions as "experiencing traumatic circumstances", "inadequate emotional response", "expanding the sphere of saving emotions". A. S. Leonova argues that employees of higher education institutions are more often "in a state of emotional impasse" than teachers of a secondary education school. However, the causes of this phenomenon are not analyzed (Leonova, 2017). V.S. Tretyakova, in line with most studies, states the existence of a problem without analyzing its causes (Tretyakova, 2019), like many other authors (Fesun, 2019). Medical aspects of the phenomenon under consideration are interestingly described by a number of foreign authors (Rosman, 2013).

It is hypothesized that negative factors damaging higher school teachers' mental and physical health are most noticeable among employees belonging to the 40-50 age group or older. As a result, a stable attitude is formed: "aging personnel is a burden for universities". Hence, V. F. Pugach does not accidentally point to the expanding variety of options for rejuvenating the teaching staff, even with the help of "surgical" methods (Pugach, 2017). The researcher proves the lack of validity of such discriminatory measures. It should also be taken into account that

the topic of discrimination in the academic environment is actively "warmed up" today under the pressure of value distortions of neo-liberalism.From the perspective of our methodology, the current discussion of the so-called "colonization" and the psychological problems arising in connection with it of opposing "white scientists" to "black scientists" may be of interest, which began, as one might assume, with the publication of K. Hart on the decolonization of Cambridge (Hart, 2018).

In foreign studies and research, other options for conflict of interest and psychological stress problems relate to difficulties in the career advancement of young personnel due to their social origin (Blome, 2019), mass layoffs of personnel as a result of a pandemic, and are described in the framework of discussions on specialized sites (Cantrell, 2019).

According to the findings made by L. Morrish in his work «Pressure Vessels: The epidemic of poor mental health among higher education staff» [Morrish,2019, p. 43–44, 51], regardless of age, university staff are increasingly seeking advice from specialists in psychological services organized in the UK due to the negative impact of a sharp increase in workload and administrative pressure.

The mentioned above scientist’s view is supported by G. Kinman, citing growth data for 6 years to 316% (the University of Warwick) and 414% (the University of Kent) of the number of employees who sought help in connection with a sharp deterioration in mental health. The researcher's conclusions relate to the need to change the conditions for using rating indicators in assessing the effectiveness of university staff, reducing the load in the scientific and pedagogical contexts. “55% of the 6,439 British scientists surveyed reported that they had symptoms such as depression, sleep problems and cognitive impairments” (Kinman, 2019).. In general, foreign colleagues proved that the main problem is related to the need to perform “illegal and unnecessary tasks”, as well as “tasks that do not make much sense”, noted by 50% of respondents for each position. The authors of publications on the Times Higher Education (THE) website point out the fact that graduate students are 1.9 times more likely to develop mental problems than their graduate colleagues. Reasonable conclusions are made that the strength of the impact of stressful and health-damaging factors in universities and education in general is several times higher than in medicine and law enforcement agencies.

A review of analytical assessment presented in the Scopus, Web of Science, CyberLeninka, RSCI and others databases have been used to apply the methodology of analysis, synthesis, and generalization of the results gained by the authors and secondary qualitative research.

Targets for the implementation of the right of a higher school teacher to safe and healthy working conditions are enshrined in our country, first of all, in the Constitution of the Russian Federation, the Labor Code, decrees of various ministries and departments. In the international context, most foreign countries have

more specific regulations and legal promises to ensure the procedure for protecting similar definitions in the academic environment. However, the essence of the concept of "safe working conditions" for teaching staff, in practice, does not include a comprehensive list of provisions testifying of the absence of factors that damage the mental and physical health of a person in the labor process. The general cause-effect description of the situation and of the essence of psychologically and physically safe working conditions in the academic environment has not yet been formed in national practice. The authors paid attention to this aspect in their reports at scientific conferences (Filippovskaya, 2020). The standpoint presented in this article develops the conclusions articulated during the reports in scientific and practical terms.

Presented below are the data of the author's express survey in the form of an interview with 9 employees of 3 universities in Yekaterinburg, conducted in September 2020.The respondents were 4 doctors of sciences (2 men, 2 women with more than 25 years of experience in education), 2 candidates of sciences (women with experience work in education for more than 20 years), 3 senior teachers (women with more than 20 years of experience in education).

Results and discussion

For comparison, we used the findings of M. Weinstein based on the results of a survey conducted among employees of Nottingham Trent University (NTU) (Weinstein, 2018). Conclusions on NTU were related to management at work (MAW) issues. Foreign colleagues pointed out the inconsistency of academic workload with its goals by introducing overtime into the norm. The only correct component of the list of the workload was called the list of the volume of classroom hours, while everything else is leading to the need to work overtime “above the norm”, when planning itself becomes “a paper exercise that has nothing to do with the actual work performed” (Weinstein, 2018).

The remarks made by Russian respondents are similar: “*There are constant references to the fact that the working week of the faculty is 36 hours a week, and the classroom load and contact work is 900 hours a year. All the rest of the time is related to the load of the second half of the day, no one monitors the performance of it and if it is possible to implement, the instructions replace one another. There is no time to live, there is no time to grow creatively either*”.

Foreign colleagues from NTU also pointed out the difficulties in trying to combine personal professional growth in the role of an educator and a researcher: “*The only way to develop and maintain a scientific career is to do it by sacrificing personal and family time and effectively doing research for free”, when email “becomes one of the types of tyranny” from both the students and the administration. The ever-changing “crazy management initiatives” are associated with the fact*

that "there is too much change, happening too quickly, without any thought about how to manage this change and how much work and stress it creates" increases the level of anxiety, forces people to be in constant expectation of "what else I may be asked to do in a short time and without the necessary preparation time".

Another common point for comparing factors that negatively affect the stability of the psychological state is the attitude of managers to the problems of NTU teachers:"*We are underfunded, undervalued, overwhelmed", "I am mentally tired and exhausted", "I have serious fears about suicide", "we are not considered people, but rather cash cows that they need to use to recoup their money", "I am offended by the contempt and disrespect with which we are treated*".

Not surprisingly, the answers of their Russian colleagues are practically identical. Moreover, there are facts about the humiliation of expanding the list of procedures that require bureaucratic registration: "*I don't know who came up with the idea of requiring at every step to draw up acts on the absence of state secrets - in every report, in every article, in any public material. It is absurd to demand such work from employees of universities, which do not even have military departments, not to mention some kind of "secret" laboratories. Nobody argues - the state secret must be kept. But then why not take from everyone a nondisclosure agreement of this state secret, even by those who do not own it, but use open sources for their research? Shortly speaking, they simply do not know what else to occupy the teachers, who, from the point of view of bureaucrats, have nothing to do, as well as to give work to managers - each paper is signed by 3 managers and endorsed by the vice-rector with certification of this signature with the official seal. With all the procedures that follow from this process, it takes a lot of time, but must be done, since without this act, publication activity will not be counted in the internal rating*".

Conclusion

At the same time, one cannot but say about attempts at the level of management of the educational systems of countries to change something. For example, in the UK, the Department of Business, Energy and Industrial Strategy, together with the Department of Education, in the first ten days of September 2020, proposed a Program Document on the Mechanism for Reducing the Bureaucratic Burden in Research, Innovation and Higher Education (Policy paper, 2020). The document declares the task of reducing the bureaucratic burden, since "*too often administrative activities distract from the main goal of research and educational activities";* it is stated that the government understands "*its share of responsibility for the growth of bureaucracy*"; identified are the "*sources of unnecessary bureaucracy*"; and it is intended to implement a package of necessary measures in the near future. Another issue is that in the entire document not a word is said about creating con-

ditions for reducing the risk of psychological discomfort in the main "providers" of educational services.

In Russian practice, there has also been a certain turn, for example, from the confusion of the analysis of the effectiveness of the work performed by the teaching staff (PPS) and scientific and pedagogical workers (NPR), which until now caused deep indignation in the academic environment. The authors cited data in their publications indicating that the identification of teaching staff (PPS) and scientific and pedagogical workers (NPR) not only indicates a violation of the law in the target settings of management, but also causes employees to falsify data on real research projects (Filippovskaya, 2019).

Following the introduction of the new state standard by the Ministry of Science and Higher Education of the Russian Federation, there appeared new instructions for teachers. However, in the monitoring materials (http://indicators.miccedu.ru/monitoring/?m=vpo) of the Department of State Policy in Higher Education and Youth Policy, the effectiveness of the publication activity of university employees is still assessed by the NPR (without specifying the share NPR in the total number of employees and in relation to the teaching staff), and the PPS appears only in tables describing age and certification parameters. It turns out that teachers (PPS) have nothing to do with publications recorded in international and national citation databases such as Scopus, Web of Science, RSCI based on the results of university monitoring. This is the activity of the scientific and pedagogical workers (NPR), while the share of income from educational activity itself in the total income of a university can reach 90% or more, and from research - a little more than 3%. However, an insignificant number of scientific and pedagogical workers (NPR), which in some universities is less than 2% of the total number of teaching staff, which gives an insignificant economic contribution to university revenues, turns out to "give out" colossal indicators in publications.

This imbalance cannot but affect the state of psychological stability, since it can be assumed that the real contribution of the scientific and pedagogical staff (NPR) to the positioning of the university in the scientific field is mystified, and the tasks of "squeezing the juices" from each teaching staff (PPS) to achieve the target indicators of NPR negatively affect the physical condition of people. For example, teachers from Yekaterinburg noted: "*In your articles examples of Stefan Grimm's suicide were given (Stefan Grimm, Chair in Toxicology at Imperial College London). This research professor committed suicide after the request of a bureaucrat under threat of dismissal to urgently find a huge grant. There was also an example with the suicide of an ordinary teacher, who could not bear the load of checking a huge number of students' works. We have no data on suicides among teachers. Apparently, we turn out to be more resistant to negativity. The choice here is simple: either quit, or die in or near the workplace, or grit your teeth and*

endure. After all, the growth in the number of cancer diseases and diseases of the cardiovascular system in higher education is practically unknown, although it would have to be analyzed. I know the department where 3 people died from oncology in 2 years, and recently we attended the funeral of an employee who died after a double stroke in the workplace caused by pressure from bureaucrats”.

The study may arouse interest among the academic community, university management organizers, and representatives of public institutions developing innovations in organizing psychological support for university employees. In conclusion, the author's approach to the essence of the used concepts of "stability of the moral and psychological context of the work of teachers" is given. This will make it possible to determine further directions of analysis, synthesis and evaluation of the presented category.

References

1. Global Forum on Academic Freedom, Institutional Autonomy, and the Future of Democracy declaration. Available at: https://rm.coe.int/global-forum-declaration-global-forum-final-21-06-19-003-/16809523e5

2. Thirteenth Session: Joint ILO–UNESCO Committee of Experts on the Application of the Recommendations concerning Teaching Personnel, Geneva, 1–5 October 2018, Geneva: International Labour Office, United Nations Educational, Scientific and Cultural Organization, 2019. 44 p. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/meetingdocument/wcms_671540.pdf

3. Temirov, T.V. Psychological patterns of the dynamics of mental burnout of the teacher's personality in modern social conditions: dissertation ... doctor of psychological sciences: 19.00.07 / TemirovTajmuraz Vladimirovich; [Place of thesis defense: Nizhny Novgorod State University of Architecture and Civil Engineering. – Nizhny Novgorod, 2011. 396 p.

4. Aminov, N.A, Morozova N.A, Smyackih A.L. Psycho-diagnostics of pedagogical abilities. Pre-tests. Moscow: Nauka, 1994. 221 p.

5. Kondrateva, O.G. The structure of burnout syndrome among teachers depending on the length of service // Azimut nauchnyh issledovanij: pedagogika i psihologiya = Azimuth of scientific research: pedagogy and psychology. 2017; 3(20):304-306.

6. Seregina, I.I., Shcherbich, L.I.. "Psychological burnout" of university teachers: causes and consequences // Problemy issledovaniya sindroma «vygoraniya» i puti ego korrekcii u specialistov «pomogayushchih» professij (v medicinskoj, psihologicheskoj i pedagogicheskoj praktike) = Problems of the study of the "burnout" syndrome and the ways of its correction among specialists of "helping" professions (in medical, psychological and pedagogical practice). Kursk: KSU. 2007; 140–143.

7. Shacz, I.K. Psychological stress in the pedagogical environment: technologies to maintain physical health // Vestnik Leningradskogo gosudarstvennogo universiteta im. A.S. Pushkina = Bulletin of the Leningrad State University named after A.S. Pushkin, 2015; 5(2):15-24. Available at: URL: https://cyberleninka.ru/article/n/psihologicheskiy-stress-v-pedagogicheskoy-srede-tehnologii-pozvolyayuschie-sohranit-fizicheskoe-zdorovie

8. Ivanov, V.D, Bardina M.Yu. Running as a health remedy // Fizicheskaya kul'tura. Sport. Turizm. Dvigatel'naya rekreaciya = Physical education. Sport. Tourism. Physical activity recreation, 2019; 4(1):41-47. Available at: URL: https://cyberleninka.ru/article/n/beg-kak-sredstvo-ozdorovleniya

9. Antipina, U. D., Alekseeva S. N., Antipin G. P., Protodiakonov S. V. Burnout syndrome // Vestnik Severo-Vostochnogo federal'nogo universiteta im. M.K. Ammosova. Seriya: Medicinskie nauki = Bulletin of the North-Eastern Federal University named after M.K. Ammosov. Series: Medical Sciences, 2017; 1(6):199-105.

10. Leonova, A. S. Emotional burnout of secondary and higher school teachers: comparative analysis // Razvitie obshchestvennyh nauk rossijskimi studentami = Development of social sciences by Russian students, 2017. 2:32-35.

11. Tretyakova, V. S. Research of the emotional burnout syndrome in the pedagogical environment // Professional'noe obrazovanie i rynok truda = Vocational education and labor market, 2019; 2:71-85. doi:10.24411/2307-4264-2019-10211

12. Fesun, H., Kanivets T. Socio-psychological determinants of the “burnout” syndrome in teachers // Pedagogicheskij al'manah = Pedagogical Almanac, 2018; 2:172-177.

13. Rosman, S. Burnout Syndrome in the Context of Entropy Neuron-Glial Networks of the Brain. Glob J Add & Rehab Med, 2017; 3(3): 555611. DOI: 10.19080/GJARM.2017.03.555611

14. Pugach, V.F. Age of teachers in Russian universities. What is the problem? // Vysshee obrazovanie v Rossii = Higher education in Russia, 2017; 1:47–55.

15. Hart, K. Decolonizing Cambridge University: A participant observer’s view // The Cambridge Journal of Anthropology, 2018; 36(2):92–106. DOI:10.3167/cja.2018.360208

16. Blome, F., Möller C., Böning A. Open house? Class-specific career opportunities within German universities // Social Inclusion, 2019; 7(1):101–110. DOI: 10.17645/si.v7i1.1621

17. Cantrell, K., Cronin L., Greatrix P., Palumbo-Liu D., Michelson E., Tourish D., Filimowicz M. How to avoid being sucked into the black hole of administration. https://www.timeshighereducation.com/features/how-avoid-being-sucked-black-hole-administration?utm_source=THE+Website+Users&utm_campaign=dcade4aaeaHow to avoid being sucked into the black hole of administration

18. Morrish, L. Pressure vessels: the epidemic of poor mental health among higher education staff // HEPI Occasional Paper. UK: Higher Education Policy Institute. Oxford, 2019; 20. 76 p. https://www.hepi.ac.uk/2019/05/23/pressure-vessels#theepidemic-of-poor-mental-health-among-higher-education-staff/ - pp. 43–44, 51.

19. Kinman, G. Effort-reward imbalance in academic employees: examining different reward systems // International Journal of Stress Management, 2019; 26(2):184–192.

20. Filippovskaya, T.V., Rumyantseva O.V. On the teacher's right to a safe psychological environment // Publichnoe/chastnoe v sovremennoj civilizacii: materialy XXII rossijskoj nauchno-prakticheskoj konferencii (s mezhdunarodnym uchastiem) = Public / private in modern civilization: materials of the XXII Russian scientific and practical conference (with international participation), April 16-17, 2020: reports / edit.: L. A. Zaks, et al. Yekaterinburg: the Liberal Arts University, 2020; 289-295.

21. Weinstein, M. Analysis of qualitative comments from the UCU workload survey, 2018 // Data from NTU Branch UCU workload survey, 2018. Nottingham Trent University. London: Produced by University and College Union, 2019; 33 p. Available at: https://www.ucu.org.uk/media/10195/NTU-branch-workload-survey-2018/pdf/NTU-UCU-workload-survey_mar19.pdf

22. Policy paper. Reducing bureaucratic burden in research, innovation and higher education. Published September 10, 2020. Department for Business, Energy & Industrial Strategy, Department for Education. UK: London (Westminster). https://www.gov.uk/government/publications/reducing-bureaucratic-burdens-higher-education/reducing-bureaucratic-burdens-on-research-innovation-and-higher-education#the-office-for-students-and-dfe

23. Filippovskaya, T.V., Rumyantseva O.V. A deer is a camel: innovation in the technologies of management of the pedagogical process at higher education institutions // World of Science. Pedagogy and psychology, 2019; 5(7). https://mir-nauki.com/PDF/89PDMN519.pdf

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NEW NURSES: HOW TO TRAIN THEM?

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Abstract*. The task of improving the quality of training for nurses is exacerbated in the current context of understanding the problems associated with the organization of medical care for the population in a pandemic. Practical medicine states an acute shortage of nurses, paramedics, relying on approximate data on their number in 120 thousand people. In this regard, at the level of the country's leadership, it is planned to regulate the reduction of the training time for specialists in demand by 8 months. This causes great tension in educational organizations, especially in those where attempts are being made to introduce innovative pedagogical technologies. The author describes his technology for the safety of the educational environment in the context of individualization of the professional training of middle-level medical personnel. She substantiates her position by analyzing the problems of national and foreign teaching practice and research data on satisfaction with the quality of teaching activities in the college of employers and students. The conclusion is made about the ways to accelerate the introduction of innovative technology.*

Keywords**:** *nurses, paramedics, innovative technologies for training medical personnel.*

Introduction

The demand for improving the quality of training of nurses is increasing globally. M. Kunst et al. (Kunst, 2018) points to a prospective nursing shortage of 10 million. A similar situation is in Belarus (Matveychik, 2020) and other CIS countries. In the analysis of national practices, the shortage of paramedical personnel is estimated at 133 thousand (Gorbacheva, 2019, https://www.ng.ru/health/2019-04-02/8_7546_personnel.html?print=Y) and 120 thousand people (RIA.ru, 2020, https://ria.ru/20200226/1565222621.html). There is an annual outflow of 6-8% of specialists from the professional sphere due to systemic overloads,

the discrepancy between the level of earnings and the psychological and physical costs of workers. In this regard, the task of not only improving the quality, but also accelerating the training of professionals able to withstand the psychological and physical climate of medical organizations, is becoming urgent.

The author has repeatedly presented his innovative technology at Russian conferences of various levels ("Continuing education: theory and practice of implementation", "Innovations in vocational and vocational pedagogical education", "Topical issues of the development of modern society, economics and vocational education", etc.) ... The essence of the technology lies in the implementation of a number of basic activities:

- research and comprehension of the orientation of individual trajectories of professional training of students to ensure the "subjectivity of self-actualization in the educational and professional environment." For this, the psychological propensity of future professionals to work with a specific social group - children, elderly people, resuscitation patients, etc .;

- provision of conditions for value-semantic regulation of the essence of individual life safety. For this, work is underway to strengthen the practical interaction of the college with medical organizations, which may become a place of work for graduates in the future, understanding the directions of tutoring of experienced medical workers in relation to students who will come to them for practice in the future;

- search for ways to expand the professional assets of college staff involved in organizing and teaching students and other activities. For this, the level of student satisfaction with the quality of the educational environment is ascertained and the level of professionalism of teachers is monitored.

To clarify the effectiveness of the use of the proprietary technology in September 2021, a study was conducted of the level of satisfaction with the quality of education and the safety of the educational space of students, as well as the level of development of their professional competencies on the part of employers.

Purpose of the study consisted in the verification of previously obtained data with the practice of implementing still elements of innovative pedagogical technology. To monitor the situation in September 2021, 272 students of 2-4 courses were interviewed through a questionnaire (specialization in nursing - 81%, in general medicine - 19%). 90% of respondents were full-time students, 86% were women, 14% were men. As a result of the study, it was necessary to find out the general opinion of students about the organization of the educational process in college, identify risky moments on the basis of processing statistical data and generalize students' proposals to improve the safety and quality of the educational environment.

Materials and methods

The author's position was based on current research reflected in the work of V. T. Vidkova (Vidkova, 2021). Despite the fact that the author describes the problems associated with the use of student translation skills from the English language, the very formulation of the problem of approximating the teacher's professional skills and the actual competencies of the student, the conditions for prompt response to the conflict moments arising in the learning process was important for us.

Attention is drawn to the studies of Elisabeth Solvik and Solveig Struksnes (Solvik and Struksnes, 1918) on the importance of modeling situations that arise in a professional environment. To compare with the conclusions of scientists, we carried out observations of the effectiveness of students' work in simulation classes. It is concluded that it is necessary to expand the variability of training sessions. Russian researchers drew attention to the need for such activities - (Laptieva, L.N. The role of simulation training in the professional adaptation of medical workers / L.N. Laptieva, T.V. Matveichik, O. P. Tsyvis // Nurse. - 2021. - Vol. 23. - No. 1. - P. 8-13. - DOI 10.29296 / 25879979-2021-01-02.)

Research results M. M. Malick, et al. (Malick, 2020) on the high efficiency of training with future pharmacists practitioners in comparison with professional teachers who do not work in pharmacy structures, helped to justify the installation of expanding the area of tutoring on the part of practicing medical personnel.

The problems of medical training, presented in more than forty publications on specialized sites and journals (Cogitare Enfermagem, American Journal of Nursing and Health Sciences, Nursing, Nursing, etc.) are considered. Analysis of the work of foreign colleagues allowed us to focus on an additional range of risk points in the organization of the educational process. Namely:

- an increase in the workload during a pandemic, in parallel with the informatization of medical services, requires the training of so-called "new nurses" who, unlike those working today and committing up to 75% of systemic errors in the first months of work, will be ready to avoid them;

- increased attention to the readiness of students to avoid mistakes in working with medicines. According to foreign data, “mistakes in medication lead to at least one death a day and injure about 1.3 million people in the United States of America every year.” in the names of medicines, in the labeling and packaging or misunderstanding of the instructions for the use of medicines "(Top 5 errors new nurses make / Best practices in nursing. Nursing education. - URL: https://laerdal.com/learn/best-practices-in- nursing-education /);

- organization of workshops on the elimination of nosocomial infections or minimizing their number, on mastering the skills of maintaining graphic documentation to ensure the safety of patients, to ensure good. pharmacological training, etc.

Results and discussion

Statistics from a broader study conducted in 2020, when 375 students were interviewed, showed that the overall level of student satisfaction with the quality of education in general is above 50%. The students expressed the highest degree of satisfaction with regard to the educational and methodological support of the educational program (95%), the least satisfaction was noted with respect to the material and technical support of the educational process (79.0%). Satisfaction of students with relations with teachers, accessibility and efficiency of contacts, as well as organization of extracurricular activities turned out to be high. According to the results of 2021, already 72% of respondents noted the high quality of the education they receive. 14% of students believe that it is necessary to increase the number of study hours for subjects important for their promising professional activity. At the same time, it was noted that 44% of respondents are not satisfied with the quality of scheduling. This is most likely due to the fact that it is compiled as operational, and is in demand for at least 2 weeks or a month, since 26% of students systematically combine study with work in their future profession, and 24% periodically.

The 2021 survey made it possible to clarify the tasks of ensuring the safety of the educational process through measures to improve the work of the canteen (buffet), provide students with drinking water, etc.

A survey of employers conducted in 2020, in the role of which were 26 people, showed that in 100% of cases there was complete satisfaction with the theoretical training of students and the level of development of practical skills. Satisfaction with the quality of training a graduate to manage a group (team) of subordinate employees is determined at the level of 92%. Only 75% of respondents consider the level of students' readiness to make independent decisions and positioning in the team as sufficient. Consequently, the task of individualizing educational trajectories in the context of the safety of the educational process has been actualized.

Conclusion

The data presented above made it possible to note that in the future, when implementing the author's technology in the college, the following activities should be continued:

- monitoring student satisfaction with the quality of education in individual disciplines and blocks of disciplines;
- analysis of the level of student satisfaction with the quality of training on simulation simulators, as well as compare it with the observations of full-time teachers and practitioners who take part in the training of students;
- expanding the educational field of the process of mastering the skills of working with information resources and new medical equipment;
- systematization of monitoring the quality of lecture and practical activities of

the teaching staff, the use of simulations (layouts, models) of professional activity with mandatory "debriefing";

- mastering the methodology used by foreign colleagues through short repetitive sessions known as "low-dose high-frequency training", which not only maintain competence, but also improve performance;

- expanding the range of objects of modeling in teaching students practical skills both in the conditions of simulating medical processes and in solving problems of preparation for self-actualization in teams;

- mastering the methodology of pedagogical assessment "distributed practice", which means immersion practice, when training is carried out over a period of time of at least one day of imitation activity, the process of integrating curricula (theory-practice), clinical variations and a range of complexity, using individualization and several options for learning strategies.

In general, it seems that the author's technology for the safety of the educational environment in the context of the individualization of the professional training of middle-level medical personnel has the right to be implemented and further developed.

References

1. Kunst, M. (2018). Front line of healthcare report 2018. Rising physician dissatisfaction in Europe signals an urgent need for change / M. Kunst, N. Chaturvedi, L. Plantevin, V. Di Filippo, D. Meyer, C. Rebhan – URL: https://www.bain.com/contentassets/294dfad7b9f94a4bb7b3c75cd90cfa7c/bain_brief_front_line_of_healthcare_report_2018.pdf

2. Matveychik, T.V. (2020). Human resources of health care of the future - the priority of today in the Republic of Belarus // Modern challenges of education and psychology of personality formation. Monograph. - Cheboksary: Sreda Publishing House LLC, 2020. - pp. 175 - 199.

3. Gorbacheva, A. (2019) Disappearing nurses. In Russia, the workload per nurse is five times higher than the WHO standards. - URL: https://www.ng.ru/health/2019-04-02/8_7546_personnel.html?print=YRIA.ru: В Минздраве заявили о дефиците среднего медицинского персонала (2020). URL: https://ria.ru/20200226/1565222621.html

4. Vidkova , V. T. (2021). Merits of On-Site Oral Translation as an ESP Teaching Strategy Applied in 2 Successive ESP Courses for Students of Medical Optics with an A2/B1 Entry Level of General English (2019/2020; 2020/2021). Proceedings of the International Conference "Science and innovations 2021: development directions and priorities" (August 18, 2021. Melbourne, Australia). P. 36-43.

5. Solvik E., Struksnes S. (1918). Training Nursing Skills: A Quantitative Study of Nursing Students’ Experiences before and after Clinical Practice. Nursing Research and Practice. Vol. 2018. |Article ID 8984028 | https://doi.org/10.1155/2018/8984028

6. Malick, M. M. (2020). Nursing Students Perceptions About the Quality of Teaching of a Pharmacist Pharmacologist and a Nurse Pharmacologist at the University for Development Studies / Martin Mumuni Danaah Malick, Florence Asibi Ziba, Sufyan Adam Yahay. Текст: непосредственный // American Journal of Nursing and Health Sciences. – Vol. 1. № 1. – P. 1-10. DOI: 10.11648/j.ajnhs.20200101.11

7. Laptieva, L.N. (2021). The role of simulation training in the professional adaptation of medical workers / L. N. Laptieva, T. V. Matveichik, O. P. Tsyvis // Nurse. - Vol. 23. - No. 1. - P. 8-13. - DOI 10.29296 / 25879979-2021-01-02.)

8. Top 5 errors new nurses make / Best practices in nursing. Nursing education. – URL: https://laerdal.com/learn/best-practices-in-nursing-education/

9. The changing landscape of nursing / Best practices in nursing. Nursing education. – URL: https://laerdal.com/learn/best-practices-in-nursing-education/

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COMPENDIUM AS A MEANS OF TEACHING MATHEMATICS IN THE CONTEXT OF DISTANCE LEARNING

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Abstract. *The article discusses one of the problems of higher educational institutions associated with the allocation of a small number of classroom hours for the study of the discipline "Mathematics". One of the ways to solve this problem is to use the experience of teachers of the Department of Mathematics of one of the universities, who have developed a compendium to help students of engineering specialties. The sections of mathematics for which the compendium was created are presented, as well as the composition of the compendium. Attention is drawn to the introduction of new information technologies in the learning process in the form of an educational and information complex, which includes an electronic textbook, virtual interactive sites for individual sections and a testing system. It is proposed to use the section of personal monitoring "Tester", designed to assess the quality of the knowledge gained on the topic studied.*

Keywords: *compendium, mathematics, typical calculation, educational information complex, electronic textbook, interactive website, tester, bank of tests.*

Introduction

At present, in higher educational institutions of Russia, the classroom load in the disciplines of the compulsory part, in particular, the natural sciences, is allocated an extremely small number of hours, while the share of independent work of students has significantly increased [2]. In this regard, the teachers of the Department of Mathematics of the St. Petersburg State Marine Technical University (SPbSMTU) have developed a compendium on the discipline "Mathematics", addressed to students of all areas of training of engineering specialties.

Purpose of the study - to show the benefits of the correct organization and systematization of the material, taking into account the specifications of the higher educational institution on the example of creating a compendium on the discipline "Mathematics".

Materials and methods

The compendium was developed on the basis of a course of lectures delivered at the SPbSMTU by teachers of the Department of Mathematics. Compared to a course of lectures focused on a certain number of hours, the compendium is distinguished by a more detailed presentation of the material and a large number of analyzed typical problems. This makes it accessible for independent study and contributes to a deeper mastering of mathematics by students.

The compendium includes the development of electronic lecture notes for all sections of the course "Mathematics":

1) elements of linear algebra;
2) vector algebra;
3) analytical geometry;
4) theory of limits;
5) differential calculus of functions of one variable;
6) integral calculus of functions of one variable;
7) differential calculus of functions of several variables;
8) rows, Fourier series;
9) differential equations;
10) multiple, curvilinear and surface integrals;
11) field theory;
12) theory of functions of a complex variable;
13) operational calculation;
14) probability theory and mathematical statistics.

Each section of the compendium is issued in the form of a separate brochure, which contains a thematic plan of the corresponding semester, extracts from the calendar of lectures and practical classes on this topic, a theoretical section, which is essentially a textbook, control questions on the studied topic and a list of questions included in the examination material. tickets. For self-control of the knowledge gained in the compendium there is a training test based on the materials of the studied topic, consisting of questions with multiple answers. At the end of the brochure is a list of recommended reading for the Engineering Mathematics Curriculum, as well as the answers to the test.

The theoretical part of the manual is presented in the form of definitions, theorems with proofs and necessary remarks. The clarity of the theoretical material is provided by a large number of illustrations and practical tasks, which are presented with a detailed analysis.

Test tasks are formulated in such a way that the choice of an answer must be made from several suggested ones. In this case, some of the tasks refer to control questions on theoretical material, the purpose of which is to check the correct understanding of the theoretical foundations of the topic being studied. Another part of the test tasks requires the ability to apply the knowledge gained to solve practical problems. The wrong answers were chosen by the test authors not by chance, but taking into account the most probable mistakes of students.

In addition, standard calculations (individual tasks) have been developed for all the above sections of the course. Workbooks have been developed to aid in performing these sample calculations as supplementary literature. At the beginning of the workbook, a zero version of a typical calculation is given, and then a detailed solution of each task included in this typical calculation is given. In addition, before solving each example in the workbook, a short theoretical material on this topic is offered, which, of course, helps in the solution process and speeds up the process of finding the necessary theoretical material. At the end of each workbook, 30 options for typical calculations are given. This number of options is quite enough to ensure that there is no overlap of options in each group of students, since the average number of students in a group is on average 25 people.

In addition, new information technologies of education have been introduced into the educational process. For the organization of independent work of students in the discipline "Mathematics" in SPbSMTU developed an educational and information complex, which includes an electronic textbook, virtual interactive sites for separate sections and a testing system.

The electronic textbook contains all sections of the mathematics course 1, 2 and 3 semesters of the curriculum. It contains a theoretical part, presented in lectures, as well as a large number of tasks that illustrate the material presented and demonstrate its application in practice.

The menu system, additional menus, as well as various bookmarks and hyperlinks reflects the structure of the electronic textbook and makes it possible to study the discipline along various routes, starting with the section corresponding to the basic level of the user.

Analysis of typical problems can be carried out interactively, that is, the user first makes an attempt to solve the problem on his own and looks at the correct answer. If in this case difficulties arise, then he can view the solution by opening the corresponding window. The textbook is supplemented with an editor, which allows, if necessary, to make corrections or make additions.

On the basis of the developed electronic textbook for some of its sections, educational interactive sites have been made, which contain theoretical material in a brief form and are intended mainly for teaching the solution of typical problems in an interactive mode. Sites are provided with animation pictures and tips in

pop-up windows. The training on the chosen topic in the educational environment "teacher - student - computer" ends with a control test.

The student's independent work with the electronic textbook is supplemented by the "Tester" section of personal monitoring, designed to assess the quality of the knowledge gained on the studied topic and to make the necessary adjustments in a timely manner, as well as to predict the results of subsequent control tests.

"Tester" is a software product that processes client requests and provides information to him using JAVA - SCRIPT technologies in HTML environment. The monitoring section is supplemented by a bank of tests for all sections of the course "Mathematics" [3].

Contacting the "Tester" is possible through the local network of the University, as well as through the Internet.

To monitor the quality of the knowledge gained for a group of students or for several groups, a shell has been developed for testing in a classroom equipped with computers. The shell includes:

• test base of tasks for the discipline "Mathematics", structured by sections of the course being studied and by the level of complexity;

• editor written on the basis of flash - technologies for editing and replenishing the test base;

• "Banker" software module for quick formation of the required test based on a client request from the database;

• "Statistics" software module, which performs statistical processing of test results.

Results and discussion

When teaching using an electronic textbook, students can independently determine the time and place of training, select sections of the curriculum of the educational material and the sequence of their study, as well as repeatedly study sections or topics from different sources until they fully assimilate this knowledge [1].

This development became especially relevant during a pandemic, when the learning process turned into a remote form. All the developed materials were immediately posted in the information system of the university and, thus, the teachers of the Department of Mathematics were able to continue the learning process without any problems in the new format.

All materials became available to students on the website of the Department of Mathematics, as well as in the Information Management System of the University (IMSU) of SPbSMTU.

Based on the order of the Ministry of Digital Development, Communications and Mass Media of the Russian Federation dated September 20, 2021 No. 982 "IMSU" is included in the register of domestic software. IMSU is the authoring development of a team of employees of the information technology department SPbSMTU.

The platform digitizes scientific, educational and business processes - its modules contain information on the main activities of the university.

Conclusion

The developed compendium is addressed to both teachers of the Department of Mathematics to prepare for classes, and students for home independent work. This material can be considered in the form of additional literature used to study the discipline and perform individual tasks with its help, as well as to prepare for control tests of various types.

Due to the fall in the educational level of applicants and the inconsistency of their knowledge with the requirements of the university, the developed compendium designed to give deeper knowledge of the discipline of mathematics can be supplemented with material for repeating the school mathematics course in the volume in which knowledge is needed for further study of the mathematics course at the university. The systematization of the material must be carried out taking into account the specifications of the university.

Today, one of the most promising areas of education development is a combination of traditional and e-learning in the form of blended learning, defined as a purposeful process of transferring and assimilating knowledge, skills, skills and methods of cognitive activity, based on a combination of traditional, computer and distance learning technologies. Blended learning involves the rational use of study time, the adaptation of the educational process to the individual needs of each student, the diversification of knowledge sources, the use of flexible tools for diagnosing and monitoring educational achievements, organizing feedback and, as a result, increasing the productivity of students' educational activities. Blended learning as an innovative form of educational activity is a complex and dynamic learning that takes place under the influence of the conditions of the external and internal environment and the effectiveness of its functioning directly depends on the initial conditions. Compliance with these conditions allows you to determine the direction of development of blended learning and ensure its success [1].

References

1. Denisova D.A., Levanova N.G., Evgrafova I.V., Verkhovod A.S. Formation of cognitive activity of technical university students using elements of blended learning in the study of quantum physics. Revista Tempos e Espacos em Educacao, v. 14, n. 33, Universidade Federal de Sergipe, Brazil, 2021.

2. Evgrafova I.V. Interdisciplinary communications for engineering students. Proceedings of the International Conference. «Process Management and Scientific Developments». – United Kingdom, Melbourne, 2021, pp. 71-76.

3. Vasilyeva N.V., Grigoriev-Golubev V.V., Evgrafova I.V. On increasing the efficiency of software for electronic (E-learing) and mobile (M-learing) learning. Magazine: "Marine Intelligent Technologies". No. 2-1 (36). - SPb .: Publishing house. SEC MORINTECH LLC, 2017. pp. 75-80.

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AUSTRALIAN NATURE IN RHYMING SLANG

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Abstract. *The article aims at providing a linguistic and socio-cultural description of Australian rhyming slang reflecting the animal and plant world of both wild and domesticated animals and cultivated plants that accompany human life. The rhymes in most cases encode animal and plant names, but there are also a few rhymes that contain the names of animals in their composition. The rhyming slang samples presented in the article are borrowed from general slang and rhyming slang dictionaries and other sources.*

Keywords**:** *linguistic and sociocultural description, rhyme, Australian rhyming slang, animal and plant world of Australia, endemic animals and plants*

Introduction

The article adopted a broad understanding of the animal world, which includes the most diverse types of living beings: animals proper, fish, birds, amphibians, insects and other types of living beings. The rhymes selected for analysis reflect the names of those animals and plants that are important for man's existence, play a significant role in human life as people come into direct contact with them. In this respect, the endemic animals, plants and insects, game and wild animals, as well as domesticated animals and birds have luck. Usually, the analyzed rhymes elude the attention of researchers citing examples of Australian rhyming slang or presenting its classification [7], [8], [10], [18].

Purpose of the study

The article continues to develop the theme set in the works of the author [3], [4], [5], [6] and aims to provide a linguistic and sociocultural description of the rhymes of Australian rhyming slang, reflecting the animal and plant world of Australia.

Materials and methods

The rhyming slang samples presented in the article are borrowed from general slang and rhyming slang dictionaries [9], [11], [13], [14], [15], [16], [17] and other sources [12].

The research methods are determined by the purpose and objectives of the research. The main method is descriptive, implemented in the techniques of systematization, generalization and interpretation of linguistic material. Linguistic methods include contextual analysis, definitional analysis, and semantic interpretation.

Results and discussion

We consider first zoological rhymes that contain the names of animals or refer to animals that were familiar to European settlers in their homeland before moving to Australia and which we find on a farm and in the countryside. These are the animals familiar to the eyes of a European: cats, goats, horses, calves, geese, ducks; small animals and parasites (toads, frogs, mice), biting and stinging insects (fleas, ticks, bees, wasps).

Most zoological rhymes are Australian in origin, with the exception of one of the older rhymes known in both Britain and Australia since the mid-19th century **frog/frog and toad** [mid-19C +] (BrE/**Aus**.) = a **road**. It safely survived the 20th century and is used in this century. Australian in origin are the rhymes **cats and mice** [20C] (**Aus.**) = **dice** and the polysemantic **white mice** [20C] (**Aus.)** that encodes: 1) **lice; 2) [1940s-50s] = dice; 3) ice.** They contend with the British rhyme **rats and mice.**

Zoological rhymes based on the image of a **goat** have to do with **tote**. The rhyme **angora ← angora goat** [20C] (**Aus**.) = **tote** (the totalizator in horse racing) came into use at the turn of the 1980s and 90s. Angora goat refers to the breed of goats with long soft hair. The synonymic rhyme **Billy Goat** [20C] (**Aus**.) = **the tote** refers to the male goat and competes with the rhyme **nanny / nanny goat** [1960s +] (**Aus**./BrE) **= the tote,** which, on the contrary, refers to a female goat. The **nanny goat** rhyme was first recorded in 1961 to become widespread in both systems of rhyming slang - British and Australian: The poor old ailing Tote - **the Nanny Goat**, as they call it. [Daily Mail (1970). Cit. Quoted from [11, p. 245]]. The rhyme **giddy goat** [1920s +] (**Aus**.) = **the tote** came into use in the 1920s. Tote is both an office that accepts bets and a device that is able to calculate the participant's chances of winning the competition. Sweepstakes are gradually becoming a thing of the past. More popular today are bookmakers, which initially accepted bets on races and horse racing at the hippodrome. Over time, they began to accept bets on dog racing and other sports. In Britain, for example, bookmakers devote most of all to football, but they also do not forget other disciplines - tennis, hockey, basketball, formula 1. In Australia, as in England, you can bet not only on horse races, but also on other competitions, including dog racing, tennis, Austra-

lian football, etc.

The rhyme **poddy calf** (a hand-fed calf) [20C] (**Aus.**) = **half** (**half-a-crown)**; The 2 s 6d half-crown was a 2 shillings 6 pence coin that was in circulation in the UK until 1970.

The rhyme **dead horse** [1940s +] (**Aus**.) = **tomato sauce** recalls phraseological units **work (off) a dead horse** - to work for wages which all go on paying off old debts and **flog a dead horse** - to try to make people interested in a subject which everyone has already fully discussed, which is no longer interesting etc. A similar rhyme **race horse** [20C] (**Aus**.) = **tomato sauce** also refers to tomato sauce, but unlike the first rhyme, it evokes completely different associations connected with a sports horse (a horse bred, trained, and kept for racing), the image of a frisky magnificent horse. Equestrian sports have been loved and appreciated in Australia for a long time: the first races for the Melbourne Cup, which have since become a significant event in the life of Australians, took place back in 1861. In the past, only Australian horses and jockeys took part in them, then since 1990 participants from other countries (New Zealand, England, Ireland, and Asian countries) began to compete. Australia prides itself on its horse racing and its ability to raise magnificent horses that compete in races all over the world. Each state holds its own races, which take place in the aura of festivals, and the Melbourne Cup races have even been declared a national holiday and a day off in Victoria.

One more rhyme exploiting the image of a horse and a foal is **horse and foal** [20C] (**Aus**.) = **the dole.** It allows to touch on the unpleasant topic of unemployment and discuss the social problem when an unemployed person lives on unemployment benefits or stands in a queue for it.

Let's turn to the rhyme that correlates with the word "**horse**": **apple sauce** [20C] (**Aus**.) = **horse**. The same rhyme in British slang describes, in particular, the last finishing race horse that 'ran like a pig'.

Dogs have always played a special role in people's lives: even the ancient Greeks, Assyrians, Huns, Gauls, and Celts fell back upon the assistance of four-legged shepherds, hunters, and guards. Nowadays, in addition to participating in protection, hunting, and in military operations, the dog is on guard duty, warns of the appearance of the enemy, is used in the communications service. In peacetime, the dog "guards the law", pursues criminals, looks for weapons, drugs and other contraband, participates in rescue operations. In addition, dogs have proven to be excellent guides for the blind, they also help the deaf and contribute to the rehabilitation of people with disabilities. [1].

The dog and the cat are the most familiar animals to London Cockneys. It is no coincidence that in the rhyming slang of the English-speaking countries we find at least a dozen rhymes encoding the dog: **cherry hog** [mid-19C], **chock and log** [20C] (**Aus**.), **Christmas log** [1970s +], **golliwog** [1910s], **hollow log** [1970s]

(**Aus**.), **London fog** [late 19C -1910s], **Yuletide log** [1970s +] and more than a dozen rhymes containing the word **dog** in combination with the names of other pets and some objects associated with dogs, for example, **Bellevue Dogs** = **clogs** (Manchester); **Cat and Dog = 1) bog**, lavatory; 2) **catalog**; **dog/dog and bone** [1940s +] (BrE/IrE) = **phone**; **dog and cat =** a **mat**; **dog and duck = ruck**, a fight; **dog and lead** = **weed**, marijuana (I lost my **Dog and Lead**); **dog and pup = a cup**; **dog's eye** [1960s] (**Aus**.) = **a meat pie** (Can I have some dog horse on me **dog eye**?) and some others.

Australian rhyming slang contains the rhymes **chock and log** [20C] (**Aus**.) = **dog**, **hollow log** [1970s] (**Aus**.) = a **racing dog**, as well as the rhyme **all stations** [20C] (**Aus**.) = an **Alsatian dog**, a German shepherd. As J. Green notes, perhaps here we have a case of comic distorted pronunciation [13, p. 17].

The rhyme **ducks and drakes** [1960s] (**Aus**.) = **shakes**, DTs encodes the most common type of mental disorder associated with alcohol abuse – "delirium tremens" or "the shakes" (usually used to mean "fever", "febrile chills"). The rhyme has been used in the Australian variant since the 1960s. It plays on the name of a (children's) game, when flat stones are thrown over the surface of the water with a sweep so that they bounce. Another rhyme based on animalistic ornithological metaphor is **ducks and geese** [1960s] (**Aus**.) = **the police**. It has been in use in the Australian rhyming slang since the 1960s.

Wild birds are represented by the rhyme **cock-sparrow** (Pron. 'Sparra') [1960s +] (**Aus.**) = **yarra,** mad, insane. The ornithological rhyme is based on the image of a male sparrow. Metaphorically, the word is used in relation to a pugnacious person and a bully.

Several rhymes contain the names of parasites, blood-sucking creatures, for example, fleas and ticks, which cause a lot of trouble for humans and animals: **fleas and itchers/itches** [1960s] (**Aus**.) = **pictures**, cinema, movie show; **fleas and scratches** [20C] (**Aus**.) = **matches**; **cattle ticks** [20C] (**Aus.**) = **Catholics**.

There are rhymes that themselves encode such parasites: **two /2 Ues** [20C] (**Aus**.) = **fleas** [13, p. 1241] and **willy lees** [1920s] (**Aus**.) = **fleas** [13, p. 1288], registered in J. Green's dictionary.

Two Australian rhymes **dibs and dabs** [20C] (**Aus**.) = **crabs**, body lice and **dribs and drabs** [20C] (**Aus.**) = **crabs** refer to pubic lice and infestation.

Some entomological rhymes containing insect names rhyme with **tea**. Australian rhyming slang contribution to insect-based tea-rhymes is **wasp and bee** [20C] (**Aus**.) = **tea**. (bees make honey, and honey is quite a suitable attribute for tea). The rhyme **Joe Ree** (**Aus**.) = **bee (s)**, on the other hand, encodes the stinging insect that makes honey.

A special colouring of the rhyme list is created by the names of wild animals, especially those which are rare and endemic animals, found only in Australia or

considered typical for Australia. In this respect, the rhyme **wombat = hors de combat**, dead is a good example. Etymologically, hors de combat (Fr.) means literally 'out of (the) fight, disabled or injured', 'out of action' (as a result of injury, etc.). The wombat is a herbivore with large claws adapted for digging the ground and digging holes, outwardly resembling small bears. Wombats are nocturnal dwelling in the southern and eastern parts of Australia, in places with suitable soil for digging holes. [3].

Proof of the uniqueness of the mammalian world is the diversity of Australia's marsupials. A striking representative is the kangaroo. They say that when James Cook saw a kangaroo, he decided that there was a two-headed animal in front of him: the head of a cub was peeping out of the animal's bag. A common myth about the kangaroo's English name is that it was a Guugu Yimithirr phrase for "I don't know" or "I don't understand"

For obvious reasons, rhyming slang has immortalized the kangaroo in a polysemantic rhyme that corresponds in Australian and British rhyming slang to the word **screw**, a prison warder. Australian rhyme, colloquially reduced to **kanga**, has been in circulation since the 1920s, and its abbreviated version has been around since the mid-20th century. The meaning 'prison warder' gave rise in the course of time to the metaphorical meaning **teacher** (about a strict and fault-finding school teacher). Three decades later, the rhyme began to be used to denote a new referent: **screw**, money earned (income, wage or salary). In British rhyming slang, **kangaroo** [20C] = **a Jew** [1920s +].

The rhyme **bull ants** [1920s-1930s] (**Aus**.) = **pants**, trousers is also based on the name of an endemic insect, the bulldog ant, a large Australian ant with large jaws and a powerful sting. Bulldog ants are found only in Australia and on the island of Tasmania and are one of the most dangerous genera and species of ants, as they have a strong sting and poison. Bites, or rather the sting of certain species, such as the red bulldog ant, can cause severe and prolonged pain that lasts for several days in humans. In some cases, severe allergic reactions and even anaphylactic shock are noted, which can lead to the death of particularly sensitive patients.

The rhyme **witchetty grub** [20C] (**Aus**.) = **cub**, a boy scout is based on the native name for the large, white, wood-boring edible larva of certain Australian moths and beetles that are part of the Aboriginal diet. [4].

After the penal colony of New South Wales was created in the eastern part of Australia in 1788, the settlement and development of Australia began, accompanied by acquaintance with the unusual nature and its representatives. As soon as the Europeans set foot on the land of the new continent, an unpleasant discovery was made: the area was already occupied by snakes. Up to 140 species of these reptiles live in Australia. Though only some of them are poisonous, meeting most of them is extremely life-threatening. Snakes can be found everywhere, in the

most unexpected places, and locals are not surprised to see reptiles in a store or in their own bathroom. But it should be noted that bites are quite rare. Most snakes in Australia are more likely to hide from a person when they approach, or simply will not leave the shelter. They do not perceive people as food and do not pounce on them. However, it doesn't hurt to be careful. There is a polysemantic rhyme **Joe Blake** [1940s +] (**Aus**.) = **snake**, colloquially reduced to the first component **joe**. At the same time, the rhyme came to be associated with the word **steak**. Its British relative is much older: **Joe Blake/joe** = 1) [late 19C +] a **cake** (BrE) (Want some **Joe Blake** mate?); 2) [20C] a **stake**, a bet. The eponymous Joe Blake is probably fictitious.

Let us now turn to the rhymes that encode the names of animals living in the water: these are, first of all, sharks which are quite diverse, and some species are very dangerous to humans. Shark attacks on humans are common in Australia's Great Barrier Reef. From time to time, the reef is visited by voracious predators, frequent guests in shallow water - sand sharks, tiger sharks and reef sharks and other species. Of these, tiger sharks are very dangerous. Reef sharks can bite a fisherman or diver. There is a serious debate in Australia over the acceptability of shark traps. The opportunity to admire the gray nurse shark in South Wales, the gray reef shark in Queensland, and the largest white shark on the south coast is used by local authorities to attract fishermen and divers.

It is not surprising that we find several rhymes with the dangerous oceanic predators lurking behind them: the rhyme **Joan of Arc = shark** in particular, and its convoluted form **jonah ← Joan of Arc** (**Aus**.) = **shark**. It exploits the name of Jeanne d ' Ark, who turned the tide of the Hundred Years War. In this sense, the rhyme has been known since the early 1940s. The rhyme is polysemantic and, in addition to the shark, correlates with such referents as: **Joan of Arc** = 1) [20C] a **park**; 2) [20C] a **lark**, a situation. In the minds of the enlightened people Joan of Arc is associated with the late medieval period in the history of England, marked by the Hundred Years War, which was a series of military conflicts between England and France and lasted a total of 116 years (from 1337 to 1453; hence the name). The pretext for military clashes was the claims of the English royal dynasty of Plantagenets to the French throne and the desire to return the lost territories. The origin of national identity and fortitude in the French people is associated with the war, which was largely facilitated by the French national heroine Jeanne d'Arc. The fate of the Maid of Orleans is sad: she was condemned as a heretic and burned at the stake. Subsequently, in 1456, Joan of Arc was rehabilitated and in 1920 canonized by the Catholic Church. [2].

The Australian rhyme **Noah’s/Noah/Noah’s Ark** (**Aus**.) = **shark** includes the name of the biblical character **Noah**, who was the last of the Old Testament patriarchs before the Flood, coming in a straight line from Adam. According to the

Bible, Noah was a righteous man, for which he was saved by God from the Flood and became the continuer of the human race. To this end, God commanded Noah to build an Ark and take there his family members and a couple of animals of each type. 365 days after the flood began, Noah and his family and the animals were able to get out of the ark, which washed ashore on the mountains of Ararat, where Noah offered sacrifices to God and received his blessing as an ancestor: be fruitful and multiply, and replenish the earth.

It is of interest to note that the popular rhyme **Noah's Ark (Noah's Ark)** is polysemantic and rhymes with a number of referents, but it is only in relation to the referent **shark** that it demonstrates its Australian origin: **Noah/Noah's/Noah's Ark** = 1) [late 19C] a **lark** (a game; crime); 2) [late 19C] a **lark** (the bird); 3) [late 19C] **park** 4) [late 19C +] **nark**, (a [police] informer, informant) → an unpleasant person; 5) **Noah** = a **shark** (Aus.); 6) **dark** (no light) [11], [14]. The rhyme **Noah's Ark = nark** ('an informer') was in widespread use in the first half of the 20th century. According to J. Ayto, it is used mainly in Australia and New Zealand in the meaning of 'an irritating person' [11, p. 4-5]: Ya knows Bill, yer getting 'to be a real **Noah's Ark**. [J. Alard. He Who Shoots Last (1968). Cit. Quoted from: [11, p. 5]. In the sense of '**shark**', the rhyme was first recorded in 1945, becoming one of the most commonly used to refer to a shark, usually in a reduced form: A lotta them beaches in Oz are full of **Noahs**. [Barry Humphries Bazza comes into his Own (1979). Cit. after: [11, p. 24]]. The use of the rhyme in the meanings of 'lark' ('a good laugh'), 'a bird' and 'park' dates back to the late 19th century., The rhyme is usually used in the abbreviated form **Noah** for the words '**park**', '**nark**', '**shark**' [2].

The rhyme **marcus clark/Marcus Clarke** [20C] (**Aus.)** = **shark** is most likely based on the name of the Australian writer of the late 19th century Marcus Clarke (1846 - 1881), who became widely known for his novel For the Term of his Natural Life (1874), which takes place in the first Australian penal colonies.

As to the the rhyme **joe marks** [1930s-40s] (**Aus**.) = **sharks**, much remains unlear: Joe Marks, who gave his name to the rhyme, is probably an unreal person.

The rhyme **after darks** (**Aus**.) = **sharks** is one of the youngest.

We may say that the gray nurse shark is lucky as it registered in a separate rhyme **gray nurse** [20C] (**Aus**.) = a **purse**. Nurse sharks reaching up to 4 meters in size are common in the shallow waters of the tropics and subtropics and are considered phlegmatic, slow coastal predators. Phlegm and apparent good nature distinguish nannies from other bloodthirsty sharks. They attack people only when they feel a direct threat to their lives.

The rhyme **John Dory and JD** (**Aus**.) = a **story** [John Dory is an edible coastal fish] shortened to the initials **JD** as in the example "What's the **JD**? What's happening?", refers to the valuable game fish sunflower; common dory. The sunflower

is also called the "St. Peter' Fish": according to legend, a round black speck, often framed by a strip of yellow color, on both sides of the fish, is the fingerprint of the Apostle Peter himself.

The rhyme **Murray cod** (**Aus**.) = **nod**, betting on the credit or, "on the nod" captured a large, predatory freshwater fish Murray cod, not associated with the Northern Hemisphere sea-cod (Gadus) species. The fish, native to the Murray-Darling Basin, Australia's largest and most important river system, is the largest exclusively freshwater fish on the continent. The long-living fish has several names: cod, greenfish, goodoo, Mary River cod, Murray perch, ponde, pondi, and Queensland freshwater cod. Murray cod is a popular fishing and aquaculture species. The fish is named after the Murray River.

The Murray cod plays a very important role in the mythology of many Aboriginal tribes in the Murray-Darling Basin, and for some tribes, especially those that live along the Murray River, the cod has been an icon. The myths of these tribes tell about the creation of the Murray River by a giant cod, which tried to escape from the hunter along a small stream. With her body and the beat of her tail, she expands the stream to the size of a river and creates bends in it.

For the word fish we found the rhyme **dirty dish** [20C] **(Aus.) = fish**.

The rhyme **cries and screeches** [20C] (**Aus**.) = **leeches** characterizes very well, in its emotional connotation, the attitude of the layman towards leeches, which in the past were used mainly for bloodletting (hirudotherapy is one of the most ancient and effective methods of treatment). As is known, today leeches successfully treat gynecological, urological, neuralgic and cardiovascular diseases, as well as sinusitis, otitis media, bronchitis, varicose veins, etc. The overwhelming majority of leeches (Hirudinea) inhabit freshwater reservoirs with stagnant or low-flowing water. They are well adapted to the predatory and parasitic way of life. Leeches are listed in the pharmacopoeial clause and are a generally recognized drug, but their appearance disgust many people and therefore the rhyme **cries and screeches** [20C] (Aus.) = **leeches** appears suitable and witty.

Our analysis of the rhymes describing the nature of Australia (flora and fauna) would be incomplete without mentioning phytomorphic rhymes. These include, first of all, the rhyme **gum trees** [20C] (**Aus**.) = **knees**, referring to the varieties of the Australian eucalyptus. It is known that Australian vegetation is dominated by two types of plants - eucalyptus (gum tree) and acacia (wattle). Gum tree is the generic name for smooth-barked trees and shrubs for three closely related eucalyptus species. The name gum tree can also be applied to black gum, sweetgum and water gum. Australia is home to between 500 and 800 species of eucalyptus trees, which range from tropical species in the north to alpine species in the southern mountains. Eucalyptus leaves are tough or leathery and are described as sclerophylls. They are the main food of koalas.

The rhyme **tree and sap** [20C] (**Aus.)** = a **tap** (faucet) plays on the connection between the tree and the tree sap that feeds the tree when it's time to bud.

The rhyme **Moreton Bay fig = gig** is based on the common name for the plant Ficus macrophylla. (See Section 4.4 in 6).

The polysemantic rhyme **haricot/haricot bean** = 1) [late 19C-1900s] **bean**, the penis; 2) [1960s +] (**Aus.) queen**, a male homosexual is based on the name of a herbaceous garden-and-field plant in the legume family whose seeds, beans, are eaten.

Conclusion

Australian rhyming slang successfully competes with its British (English) counterpart and is almost as strong, but remains less well-known and poorly studied. The article dealing with Australian nature in rhyming slang fills this gap to some extent.

Australian flora and fauna, and wildlife first of all, are represented by the rhymes that encode the names of land animals that live next to humans, are domesticated or, on the contrary, are the subject of hunting or fishing, are dangerous to humans, or are of interest to science. The rhymes in most cases encode the names of animals, while the phytomorphic rhymes encoding the names of plants are not numerous. Some rhymes have to do with endemic animals and plants. There are a few rhymes naming fish, crustaceans and molluscs, the inhabitants of the water and sea depths. There are also a few rhymes that themselves contain the names of animals and plants in their composition.

References

1. Александрова Ю. М., Горшунов Ю. В. Авторские метафоры и сравнения, основанные на образе собаки, в творчестве Джеральда Даррелла // Вестник Башкирского университета. 2016. - Т. 21. - № 3. – С. 698-705.

2. Горшунов Ю. В. Античные, библейские, мифологические и легендарные исторические личности и события в рифмованном сленге // Вестник Башкирского университета. 2017. Т. 22. №4. – С. 1047-1051.

3. Горшунов Ю. В. Австралийский колорит рифмованного сленга // International scientific conference Socio-economic sciences & humanities. 28 августа 2018. Санкт-Петербург, 2018. = Themed collection of papers from international conferences by HNRI «National development». Aug. 2018. P. I. – SPb.: HNRI «National development», 2018.

4. Горшунов Ю. В. Животный мир Австралии в рифмованном сленге // Сб. ст. международной научно-практической конференции «Творческое наследие Хадии Давлетшиной и актуальные проблемы современной филологии. VII ДАВЛЕТШИНСКИЕ ЧТЕНИЯ». Бирский филиал ФГБОУ ВО «Башкирский государственный университет. 5 марта 2020. - С. 132-136.

5. Горшунов Ю. В., Горшунова Е. Ю. Австралийские мотивы рифмованного сленга// Язык и литература в поликультурном пространстве. Материалы Международной научно-практической конференции «Язык и литература в поликультурном пространстве». Выпуск 12. Бирск: Бирский филиал БашГУ, 2017. – С. 30-35.

6. Горшунов Ю. В., Горшунова Е. Ю. Австралийский колорит рифмованного сленга: Монография. ISBN 978-5-86607-496-9. - Бирск: БФ БашГУ, 2021. – 264 с.

7. Емельянов А. А. Английский рифмованный сленг (теоретико-экспериментальное исследование): дис. ... канд. филол. наук: 10.02.04. – Иваново, 2006. – 249 с.

8. Емельянов, А. А. О функциональных особенностях английского рифмованного сленга [Текст] / А. А. Емельянов // Вестник гуманитарного факультета ИГХТУ. - 2008. Выпуск 3. - С. 188–195.

9. Кудрявцев, А. Ю. Англо-русский словарь сленга и ненормативной лексики / А. Ю. Кудрявцев, Г. Д. Куропаткин. М.: ООО «Изд-во АСТ»; Харьков: «Торсинг», 2004. – 383, [1] с.

10. Стефанович Т. И. Рифмованный сленг в австралийском варианте английского языка // Царскосельские чтения. - №17. – 2013. – С. 317-320.

11. Ayto J. The Oxford Dictionary of Rhyming Slang. - London, 2003. – 309 p.

12. Claiborne, Robert. English. Its Life and Times. - London: Bloomsbury, 1994. - 395 p.

13. Green, Jonathon. The Big Book of Rhyming Slang. – London: Cassell, 2002. – 334 p

14. Green, Jonathon. Cassell's Dictionary of Slang. - London: Cassell, 2003. – 1316 p.

15. Meredith J. Dinkum Aussie Slang. A Handbook of Australian Rhyming Slang. – London: Kenthurst, 1993. – 62 p.

16. Partridge, Eric. Dictionary of Slang & Unconventional English. 8th edn, London, 1984. 1400p.

17. Perkins, D. C. Cockney Rhyming Slang. A Domino Book, 2004. – 48p.

18. Yokose, Hiroyuki. Australian Rhyming Slang, 1999. P. 199-202 // www.tsukuba-g.ac.jp/library/kiyou/99/13.YOKOSE.pdf

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MANSI HEROIC SONGS: PLOTS AND MOTIVES

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Abstract. *In the genre structure of Mansi folklore, such a genre as heroic songs stands out. The texts talk about the past of the Mansi people, about its history, where the main character is the hero (in the Mansi language "otyr"). The purpose of this work: to analyze the texts of the Mansi heroic songs in order to identify the plot and motive of the songs. In this work, we have considered 15 Mansi songs of heroic content and identified a plot theme. An analysis of the texts showed that the heroes of the songs can defend their home and the surrounding territory, they can raid other people's settlements for various specific purposes, this can be revenge for the murder of a loved one (usually a father or brother) or the kidnapping of a woman. The hero can also go to someone else's settlement for the purpose of matchmaking, sometimes heroic, when he receives a refusal from his relatives and is forced to use force and kidnap his future wife. Heroic texts of different peoples are in the circle of attention of domestic and foreign researchers, but they did not become the subject of special study in Mansi folklore.*

Keywords: *plots, hero, otyr, Mansi folklore, heroic songs, defender, warrior.*

Introduction

In the genre diversity of Mansi folklore, heroic songs stand out, which are a kind of epic songs. The heroic song tells about the hero (hero), as well as about the events associated with the hero: exploits, protection of the weak and disadvantaged, collisions with the enemy (both a hero and a monster). Heroic songs are memories of the past of the ancestors. Such songs occupy an important place in the life of the people.

In the character system, the main character of a heroic song is a hero. The image of the hero is described on the basis of the epic and folklore texts of the Russian, Mordovian, Khakass, Yakut epos, etc., but has not been studied in the folklore of the Ob Ugrians. Currently, there are several articles on the study of the heroic legends (songs) of the Khanty [10; 13; 15] and images of the heroes of the heroic tale [9; 16]. In Mansi folklore, heroes were viewed from the point of view

of history as children of Torum [5; 6; 7] and as patron spirits [12]. The image of the hero as a character of heroic songs and as part of the mythological picture of the Mansi world. Attempts to analyze the image of the hero as a character of heroic songs and as part of the mythological picture of the Mansi are considered in the articles of S.A. Gerasimova [3; 4].

In this article, along with the meaning of "hero", the synonymous word "otyr" is used, which means "hero or tribal leader" [17, p. 87; 11, p. 67] or "prince, lord, sovereign" [2, p. 59]. In contrast to, for example, the Slavic epic, where the hero is more often warlords or tribal warriors, and the rulers are sometimes, in Mansi, on the contrary: the hero is the leader, the ruler of the settlement, less often he acts as a warrior defending his native land.

Studying heroic songs and legends, researchers note the plot of the texts. The systematization of the plots of the texts of the heroic epic of different peoples was carried out by many researchers, who singled out from 3 to 9 plots in the texts of the heroic epic. In this regard, we have made an attempt to consider the plots and motives of the Mansi heroic songs.

Purpose of the study: analyze the Mansi heroic songs in order to identify the plot and motive of the texts.

In this work, we will consider the plots and motives of the heroic songs of the Mansi people.

Materials and methods

The material of the research is the heroic songs of the Mansi people, which were published in the works of the Hungarian researchers B. Munkacsi in the Hungarian and Mansi languages [1]. Their translations into Russian are included in the folklore collection "The Heroic Epic of Mansi: Songs of the Patron Saints" [14] and in the series of books "Eminent Heroes of the Ob region" [8].

The analysis is based on an integrated approach, including historical-cultural, historical-typological, comparative-comparative research methods.

Results and discussion

We analyzed the Mansi heroic songs and conditionally singled out 3 plots: 1) the invasion of the otyr settlement by enemies, 2) the otyrs' raids on other people's settlements for a specific purpose, 3) heroic matchmaking.

One of the main plots is the plot of the invasion of enemies into the settlement of the hero-otyr or the defense of his settlement. Of the 15 reviewed texts, five with the main plot about the forays of the enemy on the fortress of a hero, five with a plot about the campaigns of bogatyrs in the fortifications of other otyrs, and three with the main plot - matchmaking.

In the texts where the main character acts as the defender of his territory, the hero is presented as strong, capable of repelling the enemy. This is indicated by his tall stature, sensitive hearing and keen eye. Its strength is shown at the moment of

drawing the bowstring of the bow (when it is released, a sound similar to a thunderclap is heard) or when it cuts the enemy with a saber so that the enemy falls like mowed mountain/forest grass. His gaze across seven lakes sees the distance, and his hearing is like that of a beast.

Considering the texts with the plot - the invasion of enemies on the settlement of the hero, the following motives can be distinguished:

• description of the settlement, which is presented as high as running clouds, as high as clouds. Also, the height of the settlement is shown as "*пупгыт сып люлит ӯсарищӯмт, / Тӧрмыт сып люлит ӯсарищӯмт* ‘In the city, up to the neck of patrons, / In the hillfort, up to the neck of Torum’"[14, p. 183]. Particular attention is paid to the protection of the city, which will not be penetrated by the clawed/ toothy squirrel.

• description of the place of residence / territory of the hero. As a rule, such texts speak only of the vastness of the vast Ob water, the direction of the enemy's attack can be indicated: The territory of the hero on one side "*Ялпыӈ вит ӧвмыӈ ялпыӈ тӯр сунсэгум* ‘I see a holy lake filled with holy waters’"[8, I, p. 33], and on the other hand – "*Тэпыӈ Ӑс хара вит ӯнлэгум, / Хӯлыӈ Ӑс хара вит ӯнлэгум* ‘I sit on the abundant waters of the nutritious Ob, / I sit on the endless waters of the Fish Obi '"[8, I, p. 35]. There are texts in which toponyms are mentioned - the names of rivers or cities.

• description of the hero himself. When describing the hero, only his *кӧр алпип* "iron body", his keen eye and keen hearing are specified. The growth of the hero is reflected in his name, for example, the name Сат-хар-сов-щаринг-тагыл-ойка means "a hero in the attire of seven skins of a male deer". The strength of the otyrs is shown not only in military operations, but also in everyday life, for example, in the text about three heroes, they rowed so that the boat could pass from three to seven long stretches in one stroke of the oar.

• description of the fight between the hero and the enemy: in contrast to the heroic songs of other peoples, a detailed description is not given in the Mansi texts. The combat between heroes and conquerors is always depicted hyperbolically. The number of enemies is always exaggerated and compared with the amount of animal hair or gnat "*Лӯв-пун, ӧс-пун ёмас ляльквe / Ты ёхтыглум* ‘Enemy in such an amount as sheep's wool, as a horse's wool / arrived here" [8, I, p. 85]; "*Осыӈ лёмвой, осыӈ палум* ‘Like fat mosquitoes, like fat gadflies’" [8, II, p. 79].

• warrior attributes. The robe of the hero is not presented in all texts, but if it was, it was described in detail, for example, in the text "Сӑт-хӑр-сӧв-щӑриӈ-тӑгыл-ӧйка апге, Ӑяс-Тӧрум мойтыг лӑвум тэрниӈ эрге" the main character put on chain mail with small cells, with an iron rim, in his hands he took a silver saber with a silver handle. Most often, the hero uses a bow with arrows, a saber and a spear.

• semantics of number, which also plays an important role in texts. Numbers 6 and 7 are found when describing the habitat of the hero "... I sit over six thresholds ... I sit over seven thresholds" [8, I, p. 33]. With the duration of the duel and the number of enemies, the numbers 3, 6, 7, 50, 150, 300 are used.

Thus, in the texts with the plot of the invasion of enemies on the fortress of the hero, 6 motives stand out.

Texts with a plot - otyrs' raids on other people's settlements for a specific purpose are presented in 5 texts. The purpose of such trips is different: for example, in the text "Намыӈ ōтыр", the bogatyr is sent to another place at the request of his wife. Unfortunately, otyr dies at the hands of a Russian hero.

In the text "Лапум-пирва-люлит-ōтыр апгe, Хōнт-Тōрум –ōйка трниӈ эргe" the hero travels to other lands in order to avenge the death of his father, father. In the same text, the plot of the attack of enemies on the fortress of the hero and the plot of matchmaking are seen.

The hero in the text "Вōрья-Ōтырт тэрниӈ эргe" attacks the settlement of another otyr with the aim of kidnapping a woman as a wife to his brother.

In the text "Хонтаӈ Лӯи-Ōтрыг мōйтыт лāвим тэрниӈ эргe" the junior hero goes to the city of the Three-seated Forest Spirit in order to free the daughter of the hero of the Land of Heaven of Fifty Heroes. He kidnaps the woman, but the Forest Spirit gathered his army and headed for the brothers' settlement. There was a fierce battle in which the enemy was victorious. And only the help of the senior hero and his troops helped the younger otyr to win. There are two plots in this text.

In the text of the song "Сакв-Сӯнт-Тōрум-Пыг-Ōйка тэрниӈ эргe" the main character goes to the headwaters of the Sakv river to svatu. He comes back with a woman, but he had no motive for getting a wife.

The motives of the songs with the plot - otyr's raids on other people's settlements - basically coincide with the plot of the songs about the attack of enemies:

• the description of the settlement, from where the hero leaves, is given;
• not in all texts, but a description of the hero's habitat is also presented;
• there is a description of the hero himself;
• the description of the duel between the hero and the enemy is presented;
• there is a description of the warrior's attributes;
• number semantics. In the text "Хонтаӈ Лӯи-Ōтрыг мōйтыт лāвим тэрниӈ эргe" the number 3 is often used: the younger hero fired three times at the Forest Spirit; three times he sent women to his older brother asking for help; the hero fought for three days between requests for help; the elder hero asked for three gifts (a golden saber, a golden ax and a bag of water). There are other numbers as well.

Thus, the motives of the songs with the plot about the raids of the heroes on other people's settlements basically coincide with the songs about the invasion of the enemies into the settlement of the hero.

In the Mansi heroic songs, there are also texts with a plot - matchmaking, heroic matchmaking. For example, in the text "Тэк-ōйка тэрниӈ эрге" the mother sends the hero to the female land, the male land, to find a bride for herself. Тэк-ōйка with his army arrive in Лонгх-авит-нёл a large city, where he finds a wife for himself. He brings her to his domain.

The song "Нāӈк-Ӯсыӈ-ōтыр, Таӈкв-тур-ōйка мōйтыг лавум тэрниӈ эрге" tells how the Prince-hero of the Larch City went to the city of the Prince-Hero with the appearance of an iron loon to woo his daughter. The wedding did not take place, since the warriors of the Hero-Prince with the appearance of an iron loon set fire to the house where the hero's people were expecting a wedding feast. Except for the otyr, everyone died (he was saved by the daughter of the Prince with the appearance of an iron loon). Having reached his uncles, otyr, whom they had provided with a herd of deer and a wagon train drawn by oxen, went to take revenge. He destroyed the settlement, killed everyone. Together with his wife, the daughter of the Prince with the guise of an iron loon, and their son returned to their possessions.

In the lyrics of the songs "Полум-Торум ōйка тэрниӈ эрге", "Отыр понсуп саӈквлы няр алум-палт тэлум Тāръяим-Кōръяим тэрнин эрге" the plot of matchmaking is also traced.

The motives of the texts with the plot - matchmaking / heroic matchmaking coincide with the motives of other plots. There is also a description of the settlement, a description of the otyr habitat, there is a description of the hero himself, the semantics of number. Unlike texts with other plots, these may also contain a description of a woman (only eyes and braids). In the texts with the main plot - matchmaking, there is no description of the duel of the heroes. Such a motive is found only in songs, where matchmaking is not the main plot, but an accompanying one. Of course, the semantics of number also apply here.

Conclusion

Thus, in the Mansi heroic texts, three plots are conditionally distinguished: 1) about the attack of enemies on the settlement of the hero, 2) about the raids of the heroes on other people's settlements (with different purposes) and 3) matchmaking. Each of the plots is presented widely. The main plot - the attack of enemies is presented in 5 texts, in 4 more texts this plot is accompanying. The plot about the raids of the heroes to other people's settlements is presented in 5 texts as the main plot and in 1 text as an accompanying one. The matchmaking plot is considered in 3 texts as the main plot and in 2 as an accompanying one. This plot reflects the traditions of the primitive communal system. As the analysis of the songs has shown, the plots and motives of the Mansi heroic songs interact with each other and are closely intertwined.

References

1. Munkácsi Bernát. Vogul népkötési gyüjtemény I–IV. Budapest: Akademiai kiado, 1910–1921. *Bd II/1. – 756 P.*

2. Afanasyeva K.V., Igushev E.A. School etymological dictionary of the Mansi language. Khanty-Mansiysk: SRC, 2011. 114 P.

3. Gerasimova S.A. The image of a hero in the Mansi heroic songs (a plot about protection from external enemies) // Bulletin of Ugric Studies. – 2021. – V. 11, № 2. – P. 233-241.

4. Gerasimova S.A. The image of the hero as part of the mythological picture of the world in Mansi folklore // Modern pedagogical education. – 2020. – № 11. – P. 228-233.

5. Dinislamova S.S. The heroic epic of Mansi as a factor in the spiritual and moral development of the individual // Modern Finno-Ugric Philology: theory and practice: coll. mat. conf. XIV Ugra readings. Izhevsk: Print-2, 2016. – P. 46-55.

6. Dinislamova S.S. Heroic epos of the Mansi people - evidence of the ancient culture and art of the people // Materials of the VIII scientific-practical conference dedicated to the memory of A. A. Dunin-Gorkavich (Khanty-Mansiysk, April 10, 2012). Khanty-Mansiysk: Printing, 2012. – P. 83.

7. Dinislamova S.S. Children of Torum - heroes of the heroic epic of Mansi // I Siberian Forum of Folklorists: abstracts. reports. Novosibirsk: Akademizdat, 2016. – P. 77-78.

8. Famous Bogatyrs of the Ob region. Khanty-Mansiysk: SRC YSU; Yugrafika; Ugra format. Book 1, 2010, 150 P.; Book 2, 2012, 171 P.; Book 3, 2015, 204 P.

9. Isaeva T.A. Tonya the hero; the image of the hero in the local mythology of the Khanty // Materials of the VI Yugorsk readings "The heroic epic of the Ob Ugrians: heritage and modernity": collection of articles. M.: Icarus, 2005. – P. 71-80.

10. Kotova L.F. Description of the Khanty heroic song of Obdorsk "Songs of the Nadym clan" - "PoLen-Awatar" // Materials of the VI Yugorsk readings "The heroic epic of the Ob Ugrians: heritage and modernity: collection of articles. M.: Icarus, 2005. – P. 47-52.

11. Kuzakova E. A. Dictionary of Mansi (Eastern dialect). Moscow: Institute of Ethnology and Anthropology RAS, 1994. 315 P.

12. Popova S.A. From the Urals to the Ob: the heroic path of the leader-hero Намын Отыр (on the issue of migrations and the formation of the Sosva-Lyapin group of Mansi) // Bulletin of Ugric Studies. – 2018. – V. 8, № 4. – P. 741-754.

13. Pyatnikova T.R. Heroic legends of the Khanty in modern conditions // Materials of the VI Ugra readings "Heroic epic of the Ob Ugrians: heritage and modernity": collection of articles. M.: Icarus, 2005. – P. 39-46.

14. Rombandeeva E.I. Heroic epic of Mansi (Vogulov): Songs of patron saints. Khanty-Mansiysk: Print-Class, 2010. – 648 P.

15. Slepenkova R.K. Description of the Khanty heroic song "Lenkh-avat-nel ar" ("The song of the divine cape") // Materials of the VI Yugorsk readings "The heroic epic of the Ob Ugrians: heritage and modernity: collection of articles. M.: Icarus, 2005. – P. 53-58.

16. Uspenskaya S.S. Yam Aliye – hero of the Khanty heroic tale // Materials of the VI Yugorsk readings "The heroic epic of the Ob Ugrians: heritage and modernity": collection of articles. M.: Icarus, 2005. – P. 63-70.

17. Chernetsov V.N., Chernetsova I.Ya. A Brief Mansiysk Dictionary. M.; L.: Uchpedgiz, 1936. 116 P.

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CORPORATE EDUCATION IN THE CONTEXT OF DIGITALIZATION

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Abstract. *The article examines the problems of the development of corporate education in the modern digital educational space. The article discusses the basic categories necessary for the socio-philosophical analysis of this phenomenon, such as "humanization of education", "digital education", "lifelong education", "corporate education" and others. As a result of analyzing the problem of actively developing corporate education in the context of digitalization, the author comes to the conclusion about stable trends in the development of corporate education. These are the processes of digitalization and multiculturalism, the study of this problem led to the conclusion that this institution is also influenced by the peculiarities of the culture of the region where the corporate university is located and the mentality of the people who work in production.*

Keywords*: corporate education, humanization of education, social institution, corporate university, digital educational space.*

Introduction

The aim of the study is to change corporate education in the context of digitalization of modern society. The process of globalization has led to active economic growth and the development of transnational corporations, which leads to the formation of extensive cultural interactions. Currently, the field of corporate education is considered one of the lucrative social spheres in education. In a short period of its development, this institution has turned into an independent sphere of social production, in which all the achievements of modern science, technology, psychology and pedagogy are used. In scientific social and humanitarian research, the problems and trends in the development of this complex social phenomenon of our time have not been fully disclosed.

Purpose of the study – in revealing new trends in the development of corporate education, such as the digitalization of the educational space and the formation of the foundations of multiculturalism in the process of retraining.

Methods

The article analyzes scientific sources on the problem of corporate education and uses general scientific methods: analysis and synthesis and deduction and induction.

Research and Results

The specificity of corporate education is the use of advanced social and technical achievements by business in the learning process in corporations, which are actively used in personnel retraining. Since the end of the last century, corporate education has developed into an independent social institution with its own social ties, forms of activity and rituals. Initially, the main function of corporate education was the function of professionalization; in the process of retraining, new professional methods of work and approaches developed by the scientific community to increase the profits of the corporation were assimilated. At present, the function of humanization has been formed in corporate education, which serves the development of a person's personality and the economic efficiency of corporations [2, p. 4237].

In recent years, more and more importance in corporate education has been attached to the development of programs and methods of its humanization, since only with the development of a person's creative potential is it possible to obtain sustainable development of an enterprise and increase profits [1, p. 65]. It should be noted that the goals and missions of companies differ in content, degree of ambition and competence, which means that educational goals and ways of achieving them may be different. In this regard, corporate education is an individual product of the company, customized for the specific goals and objectives of the corporation. This direction reduces corporate education to training performed within the framework of one corporation, and does not allow considering it on a global scale as an element of a unified system of continuing education. At the same time, human capital is considered exclusively as a means of achieving the goals of the corporation and is a competitive advantage, a measure of the value of the corporation in economic terms. It should be noted that corporate education is closely related to industrial production [2, p.4239].

In recent goals, there has been a tendency for the humanization of corporate education, in the process of training an employee an emphasis is placed on the development of his personal characteristics, which brings considerable income to corporations. In corporate universities, a personality model of a specialist is formed at the request of a corporation. After completing the training, the employee begins to recognize himself as a part of the enterprise team, on which his prosperity and economic development depend, which leads to an increase in the employee's professional interest in work and the development of the personality of the specialist himself [3, p.347]. The specialist becomes more competent, and

he begins to be interested in the goals and objectives of the enterprise, he begins to cooperate with colleagues in a "team", which brings a positive psychological and economic result. An employee of the firm, formulating his "steps" of professional growth, begins to take an active part in all manifestations of collective creativity. The employee realizes himself as a unique personality and professional who is of particular value for the corporation [7, p.55].

At the enterprises, in the training process, all advanced training methods are used that contribute to the self-development of the individual and the process of self-identification of an employee who is loyal to the corporation is underway. Students are engaged in active cognitive activity in the process of creating and modeling problems, situations related to the solution of specific professional and cognitive tasks. The process of developing new professional skills takes place in the digital educational space, which contributes to better assimilation of the material and savings in conducting classes. For example, in the process of personnel retraining, methods are used: modeling of crisis situations, exploratory research work, cases and much more [5, p.8].

Corporate education is considered in direct connection with the system of continuous education (Life Long Learning) and is an integral part of it [10, p.10]. The transition of corporate education to the digital space has made it possible to significantly expand this segment of educational services. This education has become a tool with which employees continue their development and training at work [11, p.54]. Only by satisfying the humanistic goal of personal self-improvement in the process of continuous education, it is possible to build an effective system of relationships between the individual, the employing organization, society and the state, which ultimately allows achieving the goals of the latter.

Researchers consider corporate education from the point of view of the motives and values of the learning subject. They identify the following factors that motivate a person to continue learning in the workplace:

1. By meeting the individual needs of the working person and comparing them with the opportunities of the labor market, corporate training programs help to reduce the mobility of workers both within the same organization and between employers;

2. Obtaining opportunities for continuous development of knowledge and skills for personal and career growth;

3. The intersection of the needs of the employee and the employer in the implementation of corporate training programs.

Educational potential becomes an integral part of the individual and therefore cannot be bought or sold and cannot be considered as property under existing social institutions. Thus, the idea of ensuring the possibility of further personal development through corporate education in production has received its develop-

ment, and the achievement of results and the implementation of goals, both of a specific organization and society and the state as a whole, directly depends on it.

In modern corporate education, the digitalization process is actively underway, reducing the cost of retraining personnel and increasing the efficiency of the learning process through the introduction and use of innovative technologies in education. Education, thanks to digital communications, becomes available to all employees of the organization, it becomes widespread, thanks to new ways of presenting material and affects all aspects of production activities [6, p.67].

Researchers draw attention to the fact that corporate universities are now aiming at digital effective methods of transferring knowledge that accelerate and improve the learning process of an employee of an organization. Corporate universities are actively moving to the introduction of forms of education, which are based on the self-development of subjects of the educational process, for this they use digital methods of presenting educational material. The digitalization process has affected all forms of the educational process; in the learning process, the transfer of information allows the use of books, videos, films, social networks, search engines and much more. Distance learning has become the main one when conducting classes at corporate universities. Electronic courses and vibinars, tests and various electronic simulators have been developed and are being introduced everywhere.

New forms of the corporate university have become virtual, a new digital educational space has been created, which contributes to the dissemination of new knowledge and the development of the employee's personality. In scientific works, the researchers present a one-sided tendency in the development of corporate universities in terms of benefits for the corporation itself, while the consequences of such changes for the individual as a subject of corporate education and society as a whole are not analyzed.

No less interesting is the issue of modern corporate education, the problem of the formation of multiculturalism in the modern world, which testifies to the trend of convergence of the ethnic and national components. The basis of multiculturalism is the recognition of the value of each culture and personality. Multicultural corporate education should be based on the equality of all cultures, the preservation of the cultural identity and identity of all peoples and languages of the world. Multicurning in corporate education is successfully addressed through various courses, scholarships and internships.

The trend of globalization has entailed a steady interest in its culture, in the public consciousness there was a demand for the need to know their origins, to form cultural self-identity as opposed to the trends of globalization. Currently, this trend is becoming prevalent. The problem of "westernization" of corporate education constantly arises before the organizers of the system, they are most often forced to integrate into their corporate education the way of local residents,

which reflects the cultural identity of the company's employees and Western culture. As a component of multiculturalism, these two cultures coexist in different value systems. In many cases, adherence to a national value system is associated with religion. Therefore, in conceptual terms, religion is a component of ethnic or national harmony [8, p.251].

D. Searl believed that it is through the system of education, including corporate, that the assimilation of cultural patterns and meanings, as well as the process of perception of other cultural worlds, should take place [9, p. 55]. In the context of the need for multicultural corporate education, the problem arises of developing educational and pedagogical strategies that would be able to overcome this conflict of values, especially since this goal coincides with the intercultural content of corporate education itself, which should develop interethnic and intercultural ties of transnational companies and corporations.

Conclusion

Modern corporate education in a fairly short historical period has turned from a system of retraining of personnel of a corporation into a developed social institution of education, which has a wide variety of forms and methods of forming the skills and abilities of personnel. As a result of the study, it was revealed that digitalization and multiculturalism are among the actively developing modern trends in the corporate education system. These trends permeate the entire content of the educational process of retraining universities, are manifested in the formation of a digital multicultural educational space, in the development of the personal potential of the subject of the educational process, as well as in the choice of digital forms and methods of teaching.

References

1.Rubantsova T.A. Humanism and humanization of the modern educational space // Philosophy of Education. Novosibirsk. 2015. №3. P. 63 – 70.

2. Rubantsova T.A. Problems of humanization of modern corporate education. // Professional education in the modern world. 2020. V. 10 P. 4235 – 4242.

3. Schneidewin M. Die antic Humanity. D., 1897. 574 P.

4. Dodgson M. Organizational Learning: A Review of Some // Organization Studies. 1993.V. 14.№ 3. P. 56-89.

5. Stephen Billett. Lifelong learning and self: work, subjectivity and learning // Studies in Continuing Education Vol. 32, No. 1, March 2010. P. 1-16.

6. Billett, S. Relational interdependence between social and individual agency in work and working life // Mind, Culture and Activity 13, no. 1. P. 5-69.

7. Edwards, R. 2002. Mobilizing lifelong learning: Governmentality in educational practices // Journal of Educational Policy 17, No. P.53 - 65.

8. Wheller K. Corporate Universities and Academies. N. Y. 2014. P.67-69.

9. Serle J.Rationality and Realism. What is at stake? // Daedalus Journal of American Academy of Arts and Sciences. Fall, 1993. P. 55– 56.

10. Emberly P.C. The restoration and renewal of core curricula // Providence. 1996. V. 3. P. 250–270.

11. Whitehead A.N. The Aims of Education. N.Y., 1957. 166 P.

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PUBLICATION ACTIVITY OF KAZAKHSTANI HISTORIANS AT THE PRESENT STAGE ON THE WEB OF SCIENCE, SCOPUS DATABASES, THE RSCI CORE [1]

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Abstract. *The most important criteria for assessing a scientist's activity are indicators of his publication activity, the total number of publications, their citation rate and the Hirsch index. The dynamics of the growth in the number of publications in all branches of science, including history, requires high-quality analytical testing. At present, problems of thematization and statistical processing of data on scientific publications can be solved by carrying out scientometric (bibliometric) studies.*

This article was prepared in the process of the implementation of the scientific project "Development of a scientifically grounded concept of the formation of modern historical science in Kazakhstan."

Keywords: *scientific project, scientific analysis, publication, activity, article,*

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scientometrics, bibliometrics, research, systematization, citation, Hirsch index, etc.

In the international scientific community, one of the tools for assessing and analyzing the effectiveness of a scientist and a research group is indicators of publication activity in authoritative databases, for example, in the Web of Science, Scopus. Today, even those skeptical about publications in leading databases understand that one can hardly declare oneself as a scientist without articles in reputable scientific journals. In addition, work with such information resources makes it possible to significantly speed up the search for scientific literature in a certain direction, determine the circle of the most significant authors, expand contacts, and enter into collaboration at the stage of research planning.

In this regard, in our opinion, the conclusions containing in the article of the President of the National Center for Scientific and Technical Expertise, Honored Worker of the Republic of Kazakhstan A.Zh. Ibraev "Kazakhstan science and modern tools of scientometrics" [1]. According to the author, in the current conditions, the issues of assessing and measuring the quality of scientific work of both one scientist and scientific teams and the country as a whole, are actualized.

According to In Cites, the number of Kazakhstani publications for the period from 2015 to 2019 amounted to 14852 units, or 0.10% of the amount of publications in the Web of Science Core Collection (15 488 645 units). This position corresponds to the 75th place in the ranking of 214 countries. If we take for comparison the countries of the EAEU (Eurasian Economic Union), then the picture follows: the share of Russian scientific publications during this period was 2.5% (15th in the rating), Belarus - 0.07% (81st), Armenia - 0.04% (96th place), Kyrgyzstan - 0.01% (138th place). At the same time, the indicator of the normalized average citation of Kazakhstan publications is 0.83 relative to the world average of one, which corresponds to the 183rd position in the rank of normalized average citation from 214 countries. [1]

Total for 2015-2019 more than 56% of articles of authors with Kazakh affiliation were published in journals included in quartiles Q1 and Q2. During the same period, every fifth Kazakh publication was published in a journal with a quartile Q3 and approximately every fourth scientific publication in a publication with a quartile Q4. To understand the current picture of the publication of Kazakhstan works in journals with different levels of scientific influence, let us compare it to the global one, where articles in publications with the first two quartiles during this period amounted to 72.5%. And in the Q4 quartile, an eighth of the total amount of the Web of Science Core Collection database is published.

At the same time, the volume of Kazakhstan publications in such fields of science as medicine, biological and agricultural sciences is 24%, while in the global

structure the segment of scientific publications in these areas reaches 52%. The share of social sciences, including history, in the global structure of publications is traditionally lower and amounts to 11%, which corresponds to the Kazakhstan indicator. [1]

For data analysis in scientometrics, there are several key indicators, one of which is the citation index of the scientist, the citation index of the journal, and the self-citation index, which are widely used in the scientific world to evaluate the work of researchers and their collectives.

Citation is the number of references for a scientific work. At the same time, it is generally accepted that article references are a means of scientific communication, they allow one to obtain information about the problem and trace the course of development of a given scientific research. According to researchers, the most visible process of scientific communication is presented in journal publications. The scientific article has no value, if it has not been read, used or quoted. At the present stage of the formation and development of science, articles published in international scientific journals with a high citation index are highly valued [2]. The prerogative of historical science is the development of the concept of the formation of historical consciousness. In the early 90s of the last century, the process of revising the methodological foundations of historical research in Kazakhstan began. So, in the journal "Modern higher school: innovative aspect" n.3 (Chelyabinsk) in 2011 in an article published by Professor **E.A. Abil** "Theoretical aspects of the study of the history of Kazakhstan XIX century" analysis of problems of theoretical understanding of historical processes on the territory of Kazakhstan and the development of promising areas of historical research is made. According to the author, the first decade of the development of the historical science of Kazakhstan passed under the influence of two main trends - the euphoria of the disclosure of "white spots" of history, associated mainly with various episodes of the Soviet period, on the one hand, and the dominance of the classical scientistic paradigm of scientific thinking in the form of historical materialism [6].

In 2000, academician **M.K. Kozybayev** noted that Kazakhstan historians “need to give a broad perspective to sources of research, master advanced technologies in cliometric research, and give impetus to more intensive development in methodological innovations” [7]. The above information is considered at the level of the historical community, not reaching discussion among the general public. [4]

As shown by the scientometric analysis of the works of scientists, a number of works by doctors of historical and political sciences, as well as candidates of sciences representing the Institute of State History of the KN MES RK, enjoy the highest citation rate. These include, in particular, the scientific works of the director of the Institute of State History of the KN MES RK, Doctor of Historical Sciences, Professor E.A. Abil, published in foreign and domestic publications.

Take, for example, the article by E.A. Abil " Problems and trends of modern historical knowledge in Kazakhstan " published in 2012 in the first publication of the journal "Modern Higher School: an innovative aspect" (Chelyabinsk). Take, for example, the article by E.A. Abil "Problems and trends of modern historical knowledge in Kazakhstan" published in 2012 in the first issue of the journal "Modern Higher School: an innovative aspect" (Chelyabinsk). The article examines the problems of the current state of historical knowledge in the Republic of Kazakhstan, associated with the methodological crisis, the search for national identity, the role of historical knowledge in the formation of a sovereign state. The main trends in the development of historical science in Kazakhstan in the context of global processes are outlined. According to the author of the article, one of the basic principles of historical science should be the rejection of the politicization of history, the involvement of historical research to solve contemporary political problems.

Historical consciousness is a part of ethnic self-consciousness, therefore any ill-considered (especially conscious) use of historical science to realize someone's political ambitions is futile and shortsighted. So, E.A. Abil does not agree with the opinion of the Russian researcher V. Puzanov, who asserts that the modern territories of the Kostanay and North Kazakhstan regions were previously developed by the Russians, and not by the Kazakhs, who, “having migrated to the borders of Russia, drove the Volga Kalmyks, and in the Trans-Urals the Bashkir and Russian commercial population with upper reaches of Tobol and Ishim, from Uya. Therefore, the border Russian-Kazakh conflict in the Trans-Urals over the territories of the Ishim cannot be explained by the notorious "colonial policy of tsarism", if only because the Russians mastered them first. " Is it so? Of course, this is what the author says. But V. Puzanov does not take into account that before the Kalmyks, the same Kazakhs and their kindred Nogais wandered in this territory. And before the Nogays, their ancestors were the Kypchaks. And before the Kypchaks - the Turkic-speaking Xiongnu and Ugrians, the ancestors of the Khanty, Mansi and Hungarians. And before them - the Iranian-speaking tribes - the ancestors of the Ossetians and Pamir Tajiks. In other words, if you wish, you can always find a suitable plot in the historical past to justify certain claims and ambitions. That is why history and modernity should be clearly distinguished. No events in the past can be used to make political decisions in the present [5].

Among the highly cited publications placed in the Moscow journal "History and Modern World Outlook" (2020. T. 2. No. 3. P. 54-61. DOI: 10.33693 / 2658-4654 / -2020-2-3-54-61) a special place is occupied by the article of the Deputy Director of the Institute of State History, Doctor of Historical Sciences, Professor **B.G. Ayagan** "Modernization of historical science in independent Kazakhstan." The article analyzes the development of historical science in Kazakhstan in the first years of independence. New approaches, achievements and shortcomings in

the development of science, the activities of the main research centers and educational institutions, scientific discoveries that have expanded the horizons of history in Kazakhstan are presented. It is shown that in the post-Soviet period the historical science of Kazakhstan has gone through a difficult and ambiguous path of transformation. The nature of research has changed, which is expressed in methodological approaches and methods. In addition, historians were able to search for materials in the archives both within the country and abroad.

According to B.G. Ayagan, now 30 years after the collapse of the USSR, we can confidently state that this process of separation was quite difficult. It is no secret that some historians have embarked on the platform of nationalist rhetoric or have become heralds of purely egocentric political slogans in the demarcation and delimitation of borders, coverage of bloody interethnic conflicts from the past. Further, as the author writes, a new impetus to Kazakhstani historical science was given with the instruction of President K.K. Tokayev, from new positions to consider the role of Zolotaya Orda (the Golden Horde) in the history of Kazakhstan.

In addition, scientists have prepared and published collective monographs together with scientists from Russia, Ukraine and Belarus. The new research methodology was proposed by the First President of Kazakhstan N.A. Nazarbayev in the article "Looking into the future: modernization of public consciousness", published in April 2017. A team of historians, together with the Nazarbayev Foundation, the Assembly of the People of Kazakhstan, systematically hold large international scientific conferences. Since 2018, a joint group of scientists from Russia and Kazakhstan has been working on a systematic basis, where the most pressing issues are discussed, and collective monographs are being prepared for publication.

Summing up, the scientist notes, it can be emphasized that during the period that has passed since the collapse of the Soviet Union, Kazakhstan historical science has gone through a difficult path of renewal. Both the methodology and the research methods have changed. The search toolkit has expanded, the funds of many archives, including those from far abroad countries, have become available. New generation textbooks have been prepared and published. Monographs and books were introduced into scientific circulation, which reveal the "white spots" of national history. The scientific community of Kazakhstan managed to overcome localism and reject the ideas of xenophobia and nationalism [8].

The practical significance of the updated theoretical and methodological concept allowed the authors **A.M. Auanasova, B.G. Ayagan a and E.K. Nurpeisov** to prepare an article "The historical basis of the consolidation and the Kazakh society of the unity of the nation", which aroused the interest of the international scientific community. Published in the Bulletin of Tomsk State University (History. 2018. No. 52. Problems of general history UDC 323 (574) DOI: 10.17223

/ 19988613/52/6) the article studies the history of the origin and development of polyethnicity and polyconfessionalism in Kazakhstan. The authors come to the conclusion that by the end of the twentieth century Kazakhstan has accumulated valuable experience in regulating interethnic relations, on the basis of mutual respect and tolerance, it has made it possible to consolidate society to solve complex socio-economic and political problems.

In their opinion, the history of Kazakhstan testifies to the fact that polyethnicity and polyconfessionalism did not hinder the development of social harmony. As it was in some post-Soviet republics, for example, in Kyrgyzstan, Azerbaijan, Uzbekistan, Georgia, Moldavia, the Baltic states. Here, conflicts based on ethnic and confessional contradictions led to civilian warriors and human casualties. In some states, the lack of social harmony and unity in society is still fraught with the threat of armed clashes. Kazakhstan, having passed a long way from two-ethnic and two-confessional, and then multi-ethnic and poly-confessional development, has gained valuable experience in regulating these relations, which gradually grow from mutual tolerance into mutual respect [9].

For Kazakhstan, the main foreign partners in scientific research are Russia and the United States, which account for an average of 36% and 16% of the total volume of Kazakhstan publications in the Web of Science Core Collection. However, the highest rates of normalized citation, exceeding the world average values by more than 7.5 times, were obtained by the publications of Kazakhstani scientists in collaboration with colleagues from Australia, Japan, South Korea and India in such fields of science as medicine and physics. In general, collaboration with foreign colleagues significantly increases the effectiveness of scientific research and, as a result, the prepared publications arouse considerable interest in the world scientific community and have a high citation rate. One of the important indicators of the effectiveness of scientific work is its inclusion in the number of highly cited publications, that is, included in the top 1% in terms of citation on a specific topic and year. Works with a high citation rate testify to the high quality of scientific research.

The share of highly cited publications in the total array of Kazakhstani documents published in the Web of Science Core Collection has a growing trend. **Since 2015, this indicator has increased by more than 1.5 times and in 2019 amounted to 0.43%.** In the areas of science, the largest number of highly cited publications falls on clinical medicine - 46.3%. Also, highly cited publications of Kazakhstan authors are observed in such fields of science as physics, materials science, space science, mathematics, plant growing and animal husbandry. Article-by-article analysis of highly cited Kazakhstan publications in the Web of Science Core Collection for the period from 2015 to 2019. shows that the vast majority of works were published in collaboration with foreign colleagues and were pub-

lished in journals included in the first and second quartiles Q1 and Q2. **Only 1% of highly cited publications in the Web of Science Core Collection included 63 works by Kazakhstani authors.** Among them, there are 14 publications in the field of natural sciences, 7 in technical sciences, 3 in biology, 2 in agricultural sciences, 35 in medicine, and 2 in social sciences.

In the field of the humanities, an article by K. Akanov, representing the Institute of State History in collaboration with a scientist from Russia "Orenburg in the History of Integration of Kazakh Steppe in the Russian Imperia XVIII - beginning of XX century", received a noticeable response. These are just some examples of the representation of Kazakhstan scientists and scientific organizations in authoritative scientific publications [1].

The number of scientific publications of the Institute of State History in international rating journals and domestic publications related to the KKSON MES RK is growing every year. According to the Institute's Report, only for 2014-2016 they amounted to only: 178 (2014), 137 (2015), 121 (21.10.2016).). Including foreign rating publications: 15 (2014), 4 (2015), 2 (21.10.2016). During this period, the Institute of State History of the Ministry of Education and Science of the Republic of Kazakhstan by four scientific departments carried out 6 fundamental and 4 applied scientific projects, funded under the program 055 "Fundamental and Applied Scientific Research" [10].

Thus, modern scientometrics provides a useful tool, the basics of which should be mastered by the head of each scientific organization. However, to believe that publication and citation is the main goal of scientific work is certainly wrong. Rather, they can be considered as a stage of scientific research, confirming its high level and a working tool for the analysis and planning of scientific activities at the level of the organization, the field of science, state policy in the field of science development in general.

References

1. Ibraev A. "Kazakhstan science and modern tools of scientometrics." // [electronic resource]. Access mode: URL: https://www.ncste.kz/ru/ibraev-adil-zhunusovich (Date of request:10.09.2021)

2. Kabataeva B.S., Kabataeva R.S. Key indicators of citation in science. // Bulletin of KazNU. Series "Pedagogical Sciences". No. 2 (42). 2014.

3. Lamazhaa Ch.K. Historical science of Kazakhstan in a new light. // [electronic resource]. Access mode: URL: https://socionet.ru/publication.xml?h=spz:cyberleninka:19423:16567184 (Date of request:10.09.2021)

4. Mazhitov S.F. Protecting national interests. / / " Kazakhstanskaya Pravda", January 8, 2021

5. Abil E.A. Problems and trends of modern historical knowledge in Kazakhstan. // Journal " Modern Higher School: Innovative Aspect" (Chelyabinsk). - 2012 - No. 1. - P. 12.

6. Abil E.A. Theoretical aspects of studying the history of Kazakhstan in the XIX century // Journal "Modern higher school: innovative aspect" (Chelyabinsk), 2011 - № 3. - P. 13.

7. Kozybaev M.K. Kazakhstan at the turn of the century: reflections and searches: in two books. Book. 1. - Almaty Gylym, 2000. - P. 17.

8. Ayagan B.G. Modernization of historical science in independent Kazakhstan // History and modern worldview. - 2020. - T. 2. - No. 3. - P. 54-61. DOI: 10.33693 / 2658-4654 / -2020-2-3-54-61

9. Auanasova A.M., Ayagan B.G., Nurpeisov E.K. The historical basis for the consolidation of Kazakhstan society and the unity of the nation. // Bulletin of the Tomsk State University. - History series. - 2018. - No. 52. Problems of the World History UDC 323 (574) DOI: 10.17223 / 19988613/52/6

10. Report of the Institute of State History of the KN MES RK on the work for 2014-2016.

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ONCOPATHOLOGY IN THE PRACTICE OF A DENTIST AT AN OUTPATIENT APPOINTMENT

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Annotation. *In the structure of the incidence of malignant neoplasms, on the territory of the Samara region, oncopathology of the maxillofacial region is in 15th place and is about 2.4%. In the period from 2013 to 2018, among the cancer of the oral cavity, the first place is occupied by cancer of the tongue, then the lips and salivary glands, but at the same time there is a tendency towards an increase in the cancer of the tongue. The main reasons for the growth of oncological diseases of the maxillofacial region are the latent course of the initial stages of the disease, an insufficient level of early diagnosis, untimely treatment of patients to doctors.*

Keywords: *prevalence of oncopathology, screening, cancer alertness, oral cancer*

Relevance

Oncology of the maxillofacial region accounts for about 15% of tumors in the human body. Oral cancer is one of the most common types of cancer. The total increase in the number of cancer patients over the past 10 years in our country amounted to 18%; about 2.8 million patients with various forms of cancer are registered in oncological dispensaries in Russia.

The aim of the study is to determine a modernized approach for organizing sequential actions in medical organizations of the order of providing medical care to patients with oncopathology.

Material and methods

To analyze the prevalence of malignant neoplasm of the maxillofacial region according to the statistical reports of medical institutions of the dental profile of

the Samara region and form a sequence of actions of a dentist in providing medical care to patients with oncopathology.

Results

The analysis showed that the rates of morbidity and mortality in malignant neoplasms in the Samara region in 2013-2017. (per 100 thousand people) also do not have a downward trend and exceed the level of the Volga Federal District and the Russian Federation (Fig. 1).

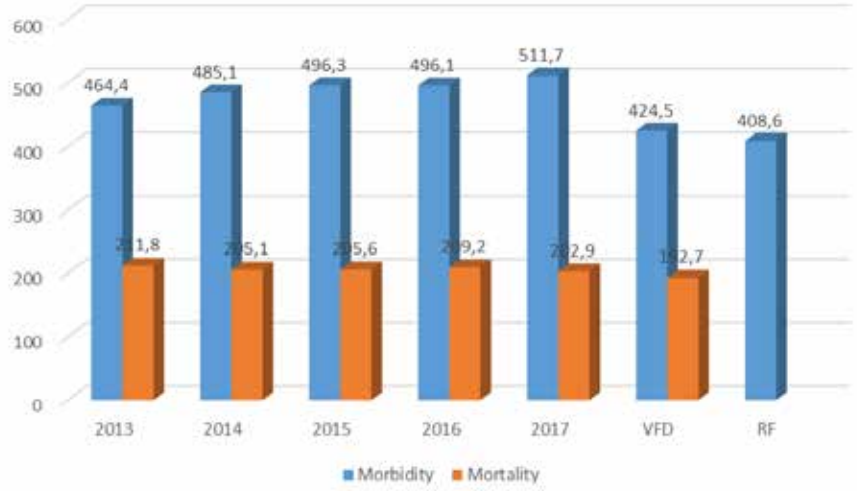

Figure 1. *Dynamics of morbidity and mortality in malignant neoplasms in the Samara region for 2013-2017. (per 100 thousand people)*

Malignant neoplasms (MNO) of the head and neck in the general structure of oncological diseases in the Russian Federation account for about 15% [4]. In the structure of the incidence of malignant neoplasms, on the territory of the Samara region, oncopathology of the maxillofacial region is in 15th place and is about 2.4%. The first 5 places are occupied by skin cancer - 41%, prostate cancer - 17%, colorectal cancer - 12%, breast cancer - 11%, lung cancer - 9%. Among cancers of the head and neck organs, cancer of the oral mucosa and the red border of the lips (OM and RBL) takes the first place, and from 62 to 80% of cases, the development of this pathology is preceded by precancerous diseases [2]. On the territory of the Samara Region, in the period from 2013 to 2018, among the cancer of the oral cavity, the first place is taken by cancer of the tongue, then the lips and salivary glands, but at the same time there is a tendency towards an increase in the cancer of the tongue (Fig. 2).

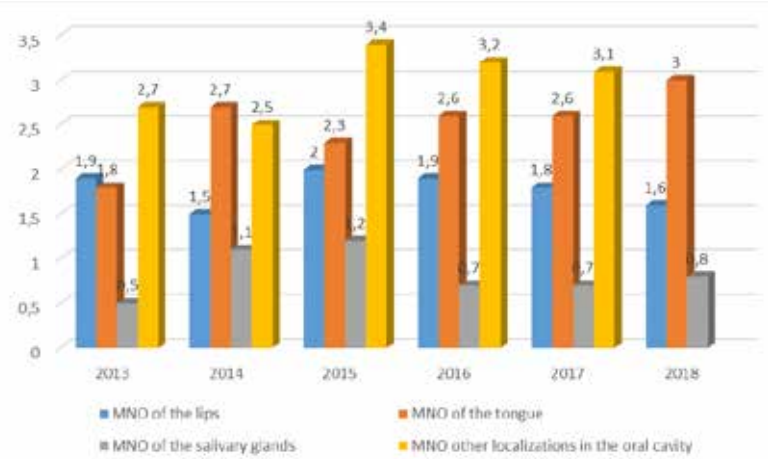

Figure 2. *The dynamics of the incidence of cancer of the oral cavity in the Samara region in the period from 2013-2018. (per 100 thousand people)*

The main reasons for the growth of oncological diseases of the maxillofacial region are the latent course of the initial stages of the disease, an insufficient level of early diagnosis, and untimely visits of patients to doctors. Thus, malignant neoplasm of the lips of 1-2 stages of the disease in the period from 2013 to 2017 was diagnosed on average in 10%, and in the later stages it ranged from 90 to 95% (Fig. 3, 4).

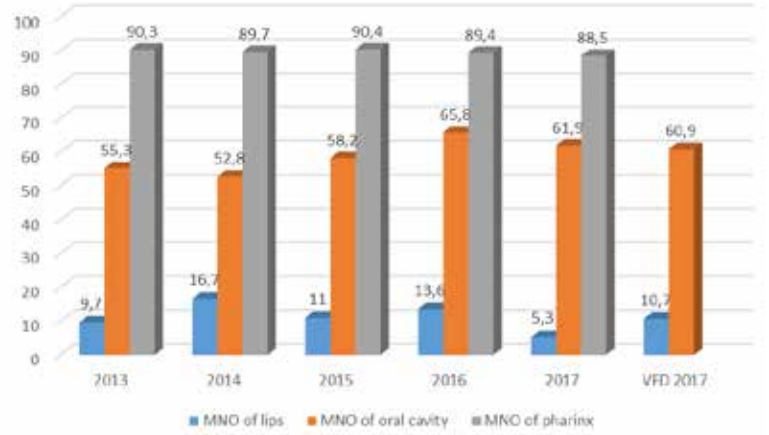

Figure 3. *Statistics of firstly diagnosed malignant neoplasms in the oral cavity of stages 1-2 (2013-2017)*

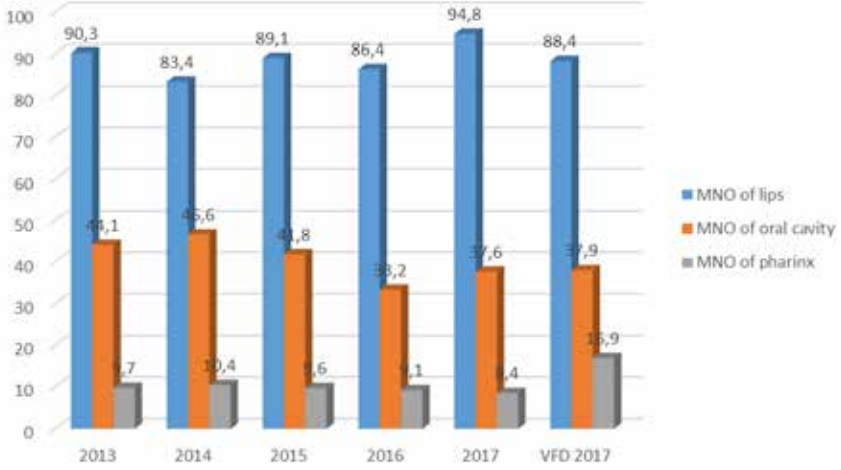

Figure 4. *Statistics of firstly diagnosed malignant neoplasms in the oral cavity of stages 3-4 (2013-2017)*

According to the results of 2018, in the Samara region, among the newly diagnosed MNO, OM and RBD, the third or fourth stages of cancer rbd were registered in 94.6%, OM - in 37.6%. The prognosis of cancer in patients is directly related to the stage of the pathological process: at the 1st stage of tumor development, the five-year survival rate is 93%, the 2nd stage is 75%, the 3rd is 55% and the fourth stage is 13%.

The main task of oncological alertness of dentists of dental clinics is the early diagnosis of cancer of the oral cavity. The concept of "oncological alertness" implies knowledge of the risk factors for the development of oncological diseases. This is the impact on the removable and the consideration of unremovable risk factors, the formation and monitoring of the risk group for the development of the disease, the identification of early signs of oncopathology and, if suspected or detected, the conduct of special examination methods [1,3]. It was found that compliance with the recommendations of doctors and adherence to a healthy lifestyle helps to reduce the progression of the disease, disability and mortality [5].

Analysis of the statistical results obtained suggests that the organization of interaction between dentists, therapists and oncologists in terms of tracking the timing and results of additional examination of patients with suspected oncopathology is not at the proper level. In this regard, since the second half of 2018, in the dental institutions of the Samara region, routing of patients with malignant neoplasms or suspected malignant neoplasms of the maxillofacial area has been

carried out. Routing is a modernized approach to the organization of sequential actions in the practice of medical organizations in order to provide medical care for various profiles. The purpose of routing is to ensure continuity at every stage of care. An effective model for organizing medical care in the regions of the Russian Federation is a three-level routing system. The first level includes the primary diagnosis of cancer and the identification of patients with suspected cancer in outpatient clinics - screening. The purpose of cancer screening is early diagnosis of neoplasms and reduction of mortality.

In most cases, tumor and precancerous formations of the oral cavity are localized in the region of the lips, the floor of the mouth, the dorsal and lateral surfaces of the tongue, the soft palate and the mucous membrane of the cheeks. In this regard, the main screening test for detecting oral neoplasms is visual inspection. As a result of the screening examination, the dentist detects or suspects the development of malignant neoplasms of the OM and RBL, the patient is given a referral for a consultation with an oncologist at a medical organization at the place of attachment of the patient. On the territory of the Samara region, a system of "tear-off coupons" has been developed and implemented. The medical organization of the dental profile sends a tear-off coupon to the clinic at the place of attachment of the patient through a courier service or a secure channel "VipNet". After an additional examination of the patient and a final diagnosis, the finalized tear-off coupon is returned to the dental clinic within a month. In case of confirmation of the malignant neoplasm of the OM or RBL, or the unclear diagnosis, the oncologist of the medical organization at the place of attachment of the patient directs him - for consultation and / or treatment at the Samara Regional Clinical Oncological Dispensary (SBHI SRCOD) - the third level of routing. If the diagnosis of malignant neoplasm is not confirmed, the patient's treatment and dispensary observation is carried out by a dentist in accordance with clinical recommendations (treatment protocols), according to the established diagnosis.

Conclusion

The low rate of appeal of the adult population to dentists significantly affects the incidence and mortality rate from malignant neoplasms of the maxillofacial region.

References

1. Aleksandrova, L.M. The role and tasks of the examination room of a medical organization providing primary health care in the active detection of malignant neoplasms / L.M. Aleksandrova, V.V. Starinskiy // Deputy Chief Physician: medical work and medical examination. - 2015. - № 5. - P. 14-25.

2. Gileva O.S., Libik T.V. Precancerous diseases in the structure of pathology of the oral mucosa // Problems of dentistry. 2013. № 2. P. 3-9.

3. Maksimovskaya L.N., Abramova M.Ya., Lukina G.I. State program of oncological screening of diseases of the oral mucosa in Russia. - 2018. - № 65. - P. 56-58.

4. Sulimov A.F., Demyanchuk A.B. Screening for atypical lesions of the oral mucosa // Dentistry. 2015. № 5. P. 79-81.

5. Sharafutdinov M.A., Latypov A.B., Valiev I.R., Potapov S.O., Kulmukhametova N.G. Organization of prophylactic medical examination of patients with oncological diseases // Science and innovation in medicine. 2017. - № 4. - P. 41-46.

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THE USE OF DERMATOSCOPY TO OPTIMIZE THE EARLY DIAGNOSIS OF SKIN MELANOMA

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Annotation. *The level of malignant neoplasms is growing every year, as a result, it is required for doctors of all specialties, experience, or auxiliary methods for early and intravital diagnosis of skin neoplasms. The technique of dermatoscopy is an integral part of equipping an office of a doctor of any specialty.*

Keywords: *dermatoscopy, melanoma, skin neoplasms*

Relevance

Epiluminescence microscopy (ELM) (in vivo skin surface microscopy, light microscopy with oil immersion, dermatoscopy, dermoscopy) is an intravital, non-invasive technique that is increasingly used by dermatologists and oncologists in clinical practice. The most popular is the use of this method for the diagnosis of skin tumors.

Improvement of the analysis of pigmented formations of the skin of melanocytic genesis is dictated by the need for differential diagnosis of early stages of malignant melanoma with benign melanocytic neoplasms - nevi.

Melanoma is a malignant tumor of the melanocytic system, accompanied by rapid lymphogenous and hematogenous metastasis, a high mortality rate. [1] The share of melanoma in the overall structure of human malignant neoplasms is 1-3%, and the incidence rate doubles every 10-15 years.

Purpose of the study

To assess the possibility of using dermatoscopy for the differential diagnosis of skin neoplasms.

Materials and methods

ELM was performed with a DELTA 20 dermatoscope (HEINE, Germany) using binocular stereomicroscopy, which provides a tenfold magnification

range. The dermatoscope was combined with a digital camera, which made it possible to document the image, its processing, providing the possibility of dynamic observation of patients with difficult-to-differentiate skin neoplasms.

Dermatoscopic examination was performed in 20 patients with skin neoplasms, of which 60% were benign melanocytic nevi, 25% - seborrheic keratoma, 10% - basal cell skin cancer, 5% - melanoma. Subsequently, patients with malignant neoplasms were sent to an oncological dispensary for histological confirmation of the diagnosis.

The method is based on the so-called "ABCD dermatoscopy rule", which allows for a semi-quantitative analysis of changes recorded using ELM [2,3].

"A" - Asymetry. To determine this feature, the studied formation was visually divided along two asymmetrically advantageous lines; in the presence of asymmetry along two axes, the index was assigned 2. 'B" - Border sharpness. To assess this feature, the neoplasm was visually divided into eight equal parts, each part having a clear border was assigned index 1. "C" - Color. There are 6 dermatoscopic colors light brown, dark brown, black, gray-blue, white, red. Index 1 was assigned to each color present in the area of the neoplasm. "D" - Dermoscopic structures. In the dermatoscopic picture, the following structural elements were distinguished: "pigment network", "stripes" ("radial radiance", "pseudopods"), "points", "granules", "unstructured areas", "blue - white veil", "regression structures", "Vascular structures"(areas of milky red, visualized microvessels). Each element, if present in education, was assigned an index of 1. The general dermatoscopic index (I_{derm}) was determined by the formula "A"+"B"+"C"+"D", where constant coefficients A=1.3 B=0.1 C=0.5 D=0.5. With a general dermatoscopic index from 4.75 to 5.45, the neoplasm is regarded as a dysplastic nevus, with a dermatoscopic index above 5.45, a preliminary diagnosis of skin melanoma was made with the patient's further referral for consultation with an oncologist.

Results

At the first stage of diagnosis, the melanocytic nature of the neoplasm was confirmed or excluded. For melanocytic pigmented formations, the following dermatoscopic signs were characteristic: "pigment network", "points", "granules", "branched stripes". At the second stage of diagnosis, the nature of the melanocytic formation (benign or malignant) was determined. For this purpose, the Stoltsa algorithm was used in this study. Dermatoscopic index values in patients with benign melanocytic neoplasms varied from 0 to 4.5. In a patient with suspected skin melanoma, the value of the dermatoscopic index was 6.4 (Tab. 1), in connection with which this patient was referred to the Regional Oncological Dispensary, where, after a histological examination, the presumptive diagnosis was confirmed.

Table 1

Dermatoscopic indices of patients with melanocytic skin neoplasms

	Melanocytic nevus	**Melanoma**
A (asymmetry)	0-1	2
B (border sharpness)	0-2	3
C (colour)	0-3	4
D (dermoscopic structures)	0-3	3
I_{derm} (dermatoscopic index)	0-4,5	6,4

Conclusions

The ELM method of malignant neoplasms is an effective method for the differential diagnosis of melanocytic neoplasms at the stage of clinical examination of patients.

References

1. Galil-Ogly G.A., Molochkov V.A., Sergeev Yu.V. Dermato-oncology. – Moscow: Medicine for All; 2005.

2. Steiner A, Pehamberger H, Wolff K. In vivo epiluminescence of pigmented skin lesions. II. Diagnosis of small pigmenled skin lesions and early detection of malignant melanoma. Am Acad Dermatol 1987; 17: 584-591.

3. Nachbar F, Stolz W, Merkle T, et al. The ABCD rule of dermatoscopy. High prospective value in the diagnosis of doubtful melanocytic skin lesions. J Am Acad Dermatol 1994; Apr;30(4): 551-559.

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REGIONAL FEATURES OF THE WEED FLORA OF GEOGRAPHICALLY REMOTE TERRITORIES

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Abstract. *A significant similarity of the family-generic structure of the compared floras was revealed, but the coefficient of their species similarity is rather low (0.28). More hygrophilous species, hemicryptophytes and polycarpic species are registered in the weed flora of the Leningrad Oblast, which is characterized by a higher moisture supply of the territory and mild winters. In the weed flora of the Lipetsk Oblast, which is less supplied with moisture and is characterized by summer dry periods, more drought-resistant plants, theophytes, and monocarpic species have been recorded. These regional differences increase the role of phytosanitary monitoring, the results of which underlie the forecast and development of regional systems for the protection of cultivated plants from weeds.*

Keywords: *weeds, heat supply, moisture supply, floristic analysis*

Introduction

As soon as a person began to cultivate plants for his own use, he began to notice other plants in the crops, which later became known as "weeds". For a long time, the growth of these plants was associated mainly with the arable land, which was reflected in the formulation: weeds are those that grow in communities of cultivated plants against the will of the farmer and reduce the yield and quality of products (Rosskopf at al., 1999; Molinar, 2002 ; Bazdyrev et al., 2004;). Similar definitions of weeds were also given by the American Scientific Society for Weed Control (Herbicide Handbook, 2002), the European Society for Weed Control (Zimdahl, 2018), and Russian botanists (Baranova et al., 2018).

At the same time, as a result of many years of research on weeds by the end of the last century in Russia, an idea was formed about them not so much as harmful objects that reduce the yield of agricultural crops, but as species confined to secondary habitats with disturbed vegetation and soil cover, which are formed both with human participation and in a natural way (Grossheim, 1948; Maltsev, 1962;

Nikitin, 1983; Ulyanova, 1998, Luneva, 2018, 2021a). Recently, in the field of plant protection, weeds have been understood to mean all plants. inhabiting land used as agricultural land, for afforestation or recreation (GOST 21507…, 2015, http://docs.cntd.ru/document/1200111134). A fundamental definition of weeds has been formed - these are wild plants of secondary habitats, both anthropogenic, with regularly disturbed vegetation and soil cover (segetal habitats), or with once disturbed (occasionally disturbed) plant and soil cover (ruderal, defilement), and natural, natural by way of disturbed habitats (Luneva, 2021b). This approach makes it possible to show the natural and anthropogenic factors in the formation of this peculiar group of plants, which determine the regular replenishment of weed species of arable land with species from the surrounding types of secondary habitats (Luneva and Mysnik, 2017).

It follows from this that the spread of weed species is determined, like all plant species, primarily by natural and climatic factors, of which the most important are heat and moisture (Alekhin et al., 1961). Correspondence of the level of heat and moisture supply of the territory to the level of demanding plant species for heat and moisture underlies the formation of regional natural floras. The totality of plant species confined to certain types of habitats (in this case, to disturbed secondary habitats) is an ecological element of the flora (Yurtsev and Kamelin, 1991), which in this case is more expedient to be called weed flora. Weed flora is a territorial aggregate of wild plants of secondary habitats with naturally or anthropogenically disturbed vegetation and soil cover, characteristic of each individual territory, corresponding to the level of demanding species of this aggregate for heat and moisture factors, which has a complex structure, formed over a long historical period and associated with species composition with native flora of primary habitats and weed flora of adjacent regions. (Luneva, 2021b).

In the structure of the weed flora, as in any other, complexes of plant species are distinguished that form in certain ecotopes, which are proposed to be called ecotopic flora or partial flora (Yurtsev, 1974), one of which is the flora of a set of segetal habitats, or segetal flora. It is this partial flora that includes weeds as harmful objects, but only the totality of all partial flora (field roads, pastures, fallow lands, wastelands, etc.) forms a weed flora, which includes not objects, but plant species. The results of comparative studies of segetal floras in other geographically distant regions (Luneva et al., 2017a; Terekhina, Luneva, 2018; Tretyakova et al., 2020) revealed the peculiarities of the composition and structure of the segetal flora in each of them. The aim of the study is to establish regional differences in the weed flora of two regions located in geographically remote regions: Leningrad (Northwestern Federal District) and Lipetsk (Central Black Earth region).

Materials and methods

The analysis was carried out on the results of field research in two regions of geographically remote regions during three years of field research (Leningrad Oblast - 2015-2017, Lipetsk Oblast- 2016-2018). To identify the floristic similarity of the compared samples, the Jaccard coefficient was used (Jaccard, 1991). Comparison of samples according to the composition of ecological groups and life forms of K. Raunkier (Raunkiær, 1937) and I.G. Serebryakov (1955). A comparative analysis of floristic richness and taxonomic diversity has been carried out (Tolmachev, 1986; Schmidt, 1980). To determine the indicators of heat and moisture supply of the analyzed territories, electronic maps of the sums of active temperatures (SAT) above 5°C and the hydrothermal coefficient (HTC) were used, posted on the Internet resource "Agroecological Atlas of Russia and Neighboring States: Agricultural Plants, Their Pests, Diseases and weeds"(Afonin et al., 2008).

Results and discussion

The territories of the compared regions differ in terms of heat and moisture supply (Table 1).

Table 1. *Indicators of heat and moisture supply of the territory of individual regions analyzed in the work*

indicators	HTC min	HTC max	HTC avg	SAT min	SAT max	SAT avg
Leningrad Oblast						
northern border	1.63	2.05	1.78	1736	1947	1854
southern border	1.51	2.06	1.78	1838	2129	2044
Lipetsk Oblast						
northern border	1.14	1.46	1.28	2434	2586	2483
southern border	1.04	1.28	1.16	2531	2767	2656

Indicators of floristic richness and taxonomic diversity of the composition of weed floras in both regions practically do not differ, which indicates the similarity of their family-generic structure (table 2).

Table 2. *Floristic richness and taxonomic diversity of weed flora of Lipetsk and Leningrad Oblasts*

Oblasts	Lipetsk	Leningrad
Number of species	119	104
Number of genuses	85	82
Number of families	27	26
Average number of species in a family (s/f)	4,41	4,00
Average number of genuses in a family (g/f)	3,15	3,16
Average number of species in a genus (s/g)	1,4	1,27

However, there are only 48 species recorded in both regional weed floras, and the floristic similarity coefficient Kj is 0.28. Differential species (registered only in one of the compared floras), distinguishing the weed flora of Lipetsk Oblast, were identified 69, and differential species in the weed flora of Leningrad Oblast - 56.

The distinctive characteristics of weed floras of geographically distant regions were revealed in a comparative analysis. The analysis of the distribution of species by ecological groups showed the predominance in the flora of the Leningrad Oblast, which is better supplied with moisture than the Lipetsk Oblast, of such species that gravitate towards habitats with increased moisture (hygrophytes, hygromesophytes, hygromesophytes, mesohygrophytes). Accordingly, less moisture-loving species (mesoxerophytes, xeromesophytes and xerophytes) prevail in the weed flora in Lipetsk Oblast (table 3).

Table 3. *Distribution of species of weed flora of Lipetsk and Leningrad Oblasts by ecological groups (%)*

Eco groups	Lipetsk Oblast	Leningrad Oblast
Hygrophytes	1.45	8.93
Hygromesophytes	2.9	5.36
Mesohygrophytes	0	5.36
Mesophytes	71	76.77
Meso-xerophytes	1.45	0
Xeromesophytes	18.8	3.57
Xerophytes	1.45	0
Helophytes	1.45	0

We also analyzed the distribution of species by groups of Raunkier life forms, a system that classifies plants according to the position and method of protecting the buds of renewal during an unfavorable period (cold or dry) (table 4).

Table 4. *Distribution of species of weed flora of Lipetsk and Leningrad Oblasts by groups of Raunkier life forms (%)*

Raunkier life forms	Lipetsk Oblast	Leningrad Oblast
hemicryptophyte	33.33	60
geophyte	1.52	9.1
therophyte	65.15	27.27
therophyte, hemicryptophyte	0	1.82
hamefit, terophyte	0	1.82

The analysis showed the predominance of hemicryptophytes (plants bearing renewal buds on the soil surface, in the surface layer or under the litter) in the weed flora of Leningrad Oblast, and therophytes (annual plants experiencing an unfavorable period in the form of seeds) in Lipetsk Oblast. The reason for this, apparently, lies in the fact that winter is an unfavorable period for plants in the North-West region, but the relatively mild conditions of the winter period contribute to the successful overwintering of hemicryptophytes, with the preservation of bud renewal. In the Central Black Earth Region, summer droughts are unfavorable, which are much easier to survive in the form of seeds (therophytes) than in the form of renewal buds on the soil surface (hemicritpophytes).

One of the types of floristic analysis is the analysis of the composition of life forms according to the system of I.G. Serebryakova. Under the life form, as a unit of ecological classification, I.G. Serebryakov understands the totality of adult generative individuals of a given species under certain growing conditions, possessing a peculiar appearance, including aboveground and underground organs. This analysis revealed the predominance of monocarpic (annual) herbaceous species, which are predominantly theophytes, in the weed flora of Lipetsk Oblast, and polycarpic (perennial) species, most of which are hemicryptophytes, in the weed flora of Leningrad Oblast (table 5).

Table 5. *Distribution of species of weeds of weed flora of Lipetsk and Leningrad Oblasts by groups of life forms according to the system of IG Serebryakov (%)*

The name of the groups of life forms according to Serebryakov	Lipetsk Oblast	Leningrad Oblast
Annuals	57.58	18.18
Short-rhizome polycarpics	9.09	3.64
Annuals - biennials	6.06	5.46
Biennials	4.55	9.09
Long-rhizome polycarpics	4.55	14.55
Core-root polycarpics	6.07	14.55
Above-ground polycarpics	0	3.64
Root-scion polycarpics	1.52	5.46
Loose-bush polycarpics	1.52	5.46
Polycarpics in general	13.66	52.75

Conclusion

Observation of plants growing on arable land and causing harm to cultivated plants inevitably leads to the conclusion that the same species grow in other secondary habitats. This determines the approach to them not just as harmful objects, but as plant species confined to habitats with disturbed vegetation and soil cover. This approach explains the ecological and geographical conditionality of the formation of territorial aggregates of these plants, which only with the use of this approach can be called the weed flora of a given territory, which will differ from the weed flora of another territory, which differs in hydrothermal parameters.

The revealed differences in the composition of weed flora in areas of geographically distant regions increase the importance of phytosanitary monitoring aimed at identifying the full species composition of the regional weed flora. The species composition of the weed flora of a certain territory is stable for a very long period, and its ecological elements, including the weed flora, are also stable. This is the basis for a long-term regional forecast that prescribes the growth of weed species in the region for at least 5 years, and, consequently, the regional features of the system for protecting cultivated plants from the harmful effects of weeds.

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References

1. Alekhin V.V., Kudryashov L.V., Govorukhin V.S. Geography of plants with the basics of botany. – Moscow: Uchpedgiz, 1961. – 532 P.

2. Afonin A.N., Green S.L., Dzyubenko N.I., Frolov A.N. (ed.). Agroecological atlas of Russia and neighboring countries: agricultural plants, their pests, diseases and weeds. [Electronic resource]. – 2008. URL: http://www.agroatlas.ru. (appeal date: 20.09.2021).

3. Bazdyrev G.I., Zotov L.I., Polin V.D. Weeds and measures to combat them in modern agriculture: a textbook for university students in the agronomic specialty. – Moscow: Publishing house of the MACA, 2004. – 287 P.

4. Baranova O. G., A. V. Shcherbakov, S.A. Senator, Panasenko N.N., Sagalaev V.A., Saksonov S.V. Basic terms and concepts used in the study of alien and synanthropic flora // Phyto-diversity of Eastern Europe. – 2018. – V. 12, № 4. – P. 4–22. DOI: 10.24411/2072-8816-2018-10031.

5. GOST 21507-2013. Plant protection. Terms and Definitions. Electronic fund of legal and normative-technical documents: [website]. – Moscow, 2015. – URL: http://docs.cntd.ru/document/1200111134 (appeal date 20.09.2021).

6. Grossheim A.A. Vegetation cover of the Caucasus. – Moscow: Publishing house MOIP, 1948. – 265 P.

7. Luneva N.N. Weed plants: origin and composition // Bulletin of plant protection. – 2018. – № 1(95). – P. 26–32.

8. Luneva N.N. Once again about weeds // Plant protection and quarantine. – 2021a. – № 8. P. 12–14.

9. Luneva N.N. Weeds and weed flora as the basis of phytosanitary zoning (review) // Transactions on applied botany, genetics and breeding. – 2021b. – V. 182, № 2. P. 139–150.

10. Luneva N.N., Bochkarev D.V., Nikolsky A.N. Distribution of weeds in the regions (on the example of the Republic of Mordovia and Leningrad Oblast) // Bulletin of plant protection. – 2017. – №. (1). P. 33–38.

11. Luneva N.N., Mysnik E.N. Weeds in segetal and ruderal habitats on the territory of Leningrad Oblast // Weed plants in a changing world: topical issues of studying diversity, origin, evolution: abstracts of the All-Russian scientific conference with international participation (St. Petersburg, November 27–28, 2017). – St. Petersburg: All-Russian Research Institute of Genetic Plant Resources, – 2017. – P. 83–84.

12. Maltsev A.I. Weed vegetation of the USSR and measures to combat it. – Moscow; Leningrad: Selkhozgiz, 1962. – 271 P.

13. Nikitin V.V. Weed plants of the flora of the USSR. – Leningrad: Science, 1983. – 454 P.

14. Serebryakov I.G. The main directions of the evolution of life forms in angiosperms // Bulletin of the Moscow Society of Naturalists. Dept. biol. – 1955. – V. 60. – Iss. 3. – P. 71–91.

15. Terekhina T.A., Luneva N.N. Distribution of weeds in the regions (on the example of Altai Krai and Leningrad Oblast) // Ecology and geography of plants and plant communities: materials of the IV International Scientific Conference (Yekaterinburg, April 16–18, 2018). – Yekaterinburg: Ural State University, Humanitarian University, 2018. – P. 935–938.

16. Tolmachev A.I. Comparative floristic methods and problems of florogenesis. – Novosibirsk: Science, 1986. – 195 P.

17. A.S. Tretyakova, O.G. Baranova, N.N. Luneva, T.A. Terekhina, Yamalov S.M., Khasanova G.R., Grudanov N.Yu. Segetal flora of some regions of Russia: characteristics of the taxonomic structure // Works on applied botany, genetics and breeding. – 2020. – V. 181, № 2. – P. 123–133. https://doi.org/10.30901/2227-8834-2020-2-123-133.

18. Ulyanova T.N. Weeds in the flora of Russia from other CIS countries. – St. Petersburg: All-Russian Institute of Plant Industry named after N.I. Vavilov, 1998. – 233 P.

19. Schmidt V.M. Statistical methods in comparative floristry. – Leningrad: Science, 1980. – 176 P.

20. Yurtsev B.A. Discussion on the topic "Method of specific floras in comparative floristry" // Botanical journal. – 1974. – V. 59, № 9. – P. 1399–1407.

21. Yurtsev B.A., Kamelin R.V. Basic concepts and terms of floristry. Textbook for a special course. – Perm: PSU, 1991. – 80 P.

22. Herbicide Handbook. Eighth ed. / W. K. Vencill (Ed.). – Weed Sci. Soc. Am., Lawrence, KS, 2002. – 493 pp.

23. Jaccard P. Distribution de la flore alpine dans le Basin de Dranseset dens quelques regions voisines // Bull. Soc. Vaud. Sci. natur. – 1901. – Vol. 37. – N 140. – P. 241–272.

24. Molinar R.H. Weed Science // California Master Gardener Handbook; D. Pittenger (ed.) – University of California, Agriculture and Natural Resources. – 2002. – P. 233–246.

25. Raunkiær Ch. Plant life forms. Transl. from Danish by H. Gilbert-Carter – Oxford: Clarendon Press, 1937. – 104 P.

26. Rosskopf E.N., R.Charudattan, Kadir J.B. Use of plant pathogens in weed control // Handbook of Biological Control. T.S. Bellows, T.W. Fisher (eds.). Academic Press, 1999. – P. 891–918.

27. Zimdahl, R. L. Fundamental of weed science. – Colorado: Academic Press, 2018. – 735 P.

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SPECIES COMPOSITION OF METACERCARIAE TREMATODES IN *BITHYNIA TROSCHELI* IN THE SOUTH OF WESTERN SIBERIA (RUSSIA)[1]

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Abstract. This work presents new information on the role of the bithyniid snails "leachi" group as the second intermediate hosts of trematodes. Bithynia troscheli (Paasch, 1842) of 13 water bodies located at 54-56 parallels from the Irtysh and Ob basins were examined. 17 species of digenetic trematode metacercariae in 7 families were found, which significantly exceeds the data presented for the European water bodies of Russia. The similarity in the species composition of metacercariae trematodes associated with B. troscheli from the Irtysh and Ob basins was 59%.

Keywords*: metacercaria, trematode, bithyniid snails, Bithyniidae, Western Siberia, Novosibirsk region, Omsk region.*

Gastropods inhabiting freshwater reservoirs of the Palaearctic are recorded not only as the first intermediate, but also as the second intermediate hosts of trematodes. Publications where this information is reflected are rare. However, there is a monograph by V.E. Sudarikov et al. [10], which summarizes the data on the species composition of metacercariae trematodes in the Eastern European region of Russia. The monograph contains information about 58 metacercariae species in 28 genera (16 families) registered in molluscs. Of these, 23 species of 7 families were recorded in mollusks of the family Bithyniidae. It should be noted that the majority of species were found in *Bithynia tentaculata* (Linne, 1758). In *Bithynia leachi* (Scheppard, 1823), metacercariae of only 7 species of 5 families were recorded. According to Ya.I. Starobogatov [9] in Western Siberia *B. leachi* do not live, however, there are two species of Bithyniids of the "*leachi*" group [*Bithynia troscheli* (Paasch, 1842) and *Bithynia inflata* (Hansen, 1845)]. The bithyniid snails "*leachi*" group in water bodies of the steppe zone of the West

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Siberian Plain were noted as the second intermediate hosts for 11 metacercariae trematodes species [1, 6]. The purpose of this study is to analyze the species composition of metacercariae trematodes associated with prosobranch molluscs of 13 populations of *B. troscheli* from the Ob and Irtysh basins (in the Novosibirsk and Omsk regions).

Materials and methods

The species composition of metacercariae trematodes associated with Bithyniidae family mollusks has been carried out by us from 1994 to the present [4]. This study includes part of the collections from the reservoirs of the Novosibirsk and Omsk Oblasts (south of Western Siberia). In the Ob basin, *B. troscheli* were collected both in the floodplains in the upper reaches of the Ob (**I** - below the dam of the Novosibirsk - 54°53′23″, 83°05′18″)[2], and in its tributaries of the first and second order (**II** Orda river 54°22′76″, 81°55′26″; **IV** Talmenka river 54°42′25″, 83°16′50″; **V** Karakan river 54°50′22″, 82°44′94″; **VI** Uen river 55°31′0, 83°16′0), as well as in the Berdsky bay (**III** - 54°47′04″, 83°05′43″) of Ob reservoir.

From the Irtysh basin, in the Omsk Oblast bithyniid snails found were collected in the middle reaches of the river in floodplain areas (**IX** - 55°49′00″, 74°31′00″) (**X** - 54°79′, 73°40′) (**XI** - 55°06′, 73°14′), as well as in tributaries of the Irtysh of the second order (**VII** Musikha river 55°52′16″, 80°05′18″) and Murashevskoe lake (**VIII -** 55°43′16″, 75°34′39″) in the Novosibirsk Oblast were examined. All these reservoirs are located in the forest-steppe zone of the West Siberian Plain. In addition, two lacustrine samples of bithyniid snails from the forest bog zone in the Omsk Oblast were studied: Krivoye lake (**XII** -56°25′, 74°37′), and Shatanovskoye lake (**XIII** - 56°75′, 75°15′). The definition of mollusks was carried out according to the key [9]. **608** specimens of *B. troscheli* from the Ob basin, and **657** specimens of *B. troscheli* from the Irtysh basin were examined by the compressor method.

When determining metacercariae trematodes, the diameter and thickness of the cyst were measured. The cyst was removed mechanically or dissolved in antiformin. Excysticated metacercariae were measured after fixation with acetic acid carmine [10]. Temporary preparations are cleared with glycerin. When identifying trematodes, the works of Russian and foreign authors mentioned by us earlier [5] were used.Using the Jaccard index, the similarity of the species composition of metacercariae trematodes in *B. troscheli* from the Irtysh and Ob basins was analyzed.

$$K_j = \frac{c}{(a+b)-c}$$

Where *a* — number of metacercariae trematodes species in bithyniid snails from the Ob basin

b — number of metacercariae trematodes species in bithyniid snails from the Irtysh basin,

2 Samplingsite / Geographicalcoordinates (N, E)

c — number of trematode species common to bithyniid snails from the Ob and Irtysh basins

Results

In the present study, 17 species of digenetic trematode metacercariae in 7 families were found in *B. troscheli* from the water bodies of the Irtysh and Ob basins of the Novosibirsk and Omsk Oblasts. Here is a systematic list of the trematodes that we have discovered. For each species, a brief description of the morphological features of metacercariae and morphometric parameters, their localization in the host's body, the maximum infection intensity is given, the places of their detection are indicated, as well as information about previous registrations.

Representatives of the family **Monorchidae** Odhner, 1911 belong to the intestinal parasites of fish. Earlier, their metacercariae were found in mollusks, insects, crustaceans, and leeches [10]. Monarchid metacercariae found in mollusks in the Eastern European region belong to seven species of three genera. Prosobranch molluscs have all 7 species. Metacercariae of monarchids develop inside globular cysts with a thin fragile shell. Cysts are large, thin-walled. Localization of metacercariae in the liver and other organs of the mollusk. In a number of studies, progenitic individuals have been noted [see. review 5]. Metacercariae of two genera, which are similar in morphometric parameters, but differ in the shape and size of the excretory bladder, were found in bithyniid snails from the reservoirs of Western Siberia [3].

Representatives of the first genus ***Asymphylodora*** Looss, 1899 are characterized by a long esophagus and a small thin-walled excretory bladder. We found metacercariae of one species - ***A. tincae*** Modeer, 1790.They were registered in three populations (**II III VIII**), with a maximum infection intensityof 4 specimens. The diameter of the cysts is 0.31-0.49 mm. Earlier, metacercariae of *A. tincae* were recorded in 10 species of gastropods, both pulmonary and prosobranch, including *B. leachi* [10].

Representatives of the second genus ***Parasymphylodora*** Szidat, 1943 are characterized by a large tubular thick-walled excretory bladder. In the present study, metacercariae of two species of this genus were found. The diameter of the cysts (0.260 - 0.320 mm) and the size of the body of metacercariae (length 0.63-0.68; width 0.31-0.51 mm) of these species have no significant differences, but they differed in the ratio of the suckers, the size of the spines on the anterior part body. Thus, the spines on the anterior part of the body of the metacercariae of ***P. progenetica*** Sercowa et Bychowsky, 1940 are smaller than those on the posterior part. Metacercariae of the second species of this genus, ***P. markewitschi*** Kulakowskaja, 1947, have larger spines on the front of the body than on the back.The abdominal sucker is 1.5 times larger than the oral one in *P. progenetica*, or less than 1.5 times for *P. markewitschi*. Progenic specimens of *P. progenetica* from *B. troscheli*

contained up to two hundred eggs in the uterus. We found *P. progenetica* metacercariae in two populations (**III** and **VIII**), with a maximum infection intensity of 1 specimen. The species was recorded in water bodies of both Irtysh and Ob basins, but only in the Novosibirsk region. Metacercariae of the second species were noted by us in only one population (**III**). The maximum infection intensity was 2 specimens. Some of the material is defined only to the genus. Metacercariae ***Parasymphylodora sp.*** recorded in five populations (**II VIII XI XII** and **XIII**), with a maximum infection intensity of 12 specimens.

Metacercariae of the second family **Opecoelidae** Ozaki, 1925 were found in representatives of different types of animals (amphipods, leeches, mollusks, etc.).In contrast to the previous family, the integument of Opecoelidae family metacercariae is smooth, the abdominal sucker is 1.8-1.9 times larger than the oral one. On the territory of the Eastern European region, metacercariae of one genus *Sphaerostoma* Rudolphi, 1809 of two species were found in mollusks [10]. In the present study, metacercariae of one species, ***Sphaerostomum globiporum*** (Rudolphi 1802), were found, only in one population of *B. troscheli* (**I**). Spherical cysts with a thin fragile shell, 0.20-0.28 mm in diameter. The maximum infection intensityis 145 metacercariae. Earlier, metacercariae *S. globiporum* were found in bithyniid snails "*leachi*" group in water bodies of the steppe zone of the West Siberian Plain [1]. Quantitative data for trematodes at all stages of their life cycle are rare. The paucity of such studies is primarily due to the fact that, in addition to helminthological studies of all hosts with which the trematode life cycle is associated, it should also include quantitative information on the biology of all hosts (intermediate and final). We have traced the seasonal dynamics of the development of the trematode *S. globiporum*. Bithyniid snails collected in May were studied from May to September, which made it possible to trace the development of the trematode in a seasonal aspect. The overwintered individuals contained trematodes infection of the last year, which by the spring became sexually mature, being in the sporocyst cavity. Each sporocyst contained about four non-cystic metacercariae and/or sexually mature marites with eggs. The entire space of the sporocyst between metacercariae and marita was filled with eggs, the number of which varied from tens to several hundred. The maximum number of sporocysts in one *B. troscheli* is up to 180 specimens. The size of sporocysts is up to 3 mm. Sporocysts actively moved and moved into the water, leaving the shell of their host. They made worm-like movements, which could attract the attention of the final hosts - fish. Trematodes detected in summer (June-July) can be divided into two groups (infection of the last year, and infection of the present year). The first group of trematodes consisted of sporocysts and metacercariae overwintered in the host. The number of sporocysts (last year infection) in the mollusk decreased from June to August by 9-10 times. Each sporocyst contained up to 12 larvae

(tailless cercaria, non-cysticated metacercariae and marita) and eggs. In the cavity of the mollusk, both encysted and non-encysted metacercariae were noted (ratio 1:6). The second group of trematodes (infection of the present year) was represented by smaller sporocysts (up to 1.2 mm). Their number in one mollusk reached 130 specimens. Each contained 2-3 copies short-tailed cercariae. Daughter sporocysts (1.5 mm in size) contained from 2 to 5 larvae. Their emission, neither in June nor in July, was not recorded, but was found only in August. When bithyniid snails were kept under laboratory conditions, the emission of cercariae continued in September too. In autumn, in the infected molluscs, in addition to daughter *S. globiporum* sporocysts, maternal sporocysts were also noted. The total number of all sporocysts is up to 30 specimens in one host. At the same time, only short-tailed cercariae were found in some sporocysts, and only tailless cercaria in others (ratio 7:2).To estimate the abundance of *S. globiporum* trematodes in a particular ecosystem, it is necessary to take into account the density of infected molluscs and the abundance index of trematodes at each stage, in different months. Five-year counts of the *B. troscheli* population showed from 44±11 spec./m^2 to 211±32 spec./m^2 in different years.A quantitative assessment of *S. globiporum* trematodes revealed that in different years in May, the density of trematodes per 1 m^2 was: 137-822 sporocysts, 248-1488 maritas, 290-1740 metacercariae and 2474-14844 eggs. By August, only eggs remain of these forms, and besides this, new sporocysts with short-tailed cercaria are formed. Their number is 791-4749 eggs and 260-1560 sporocysts containing from 8580 to 51,480 cercaria.

Metacercariae of the third family **Echinostomatidae** Dietz, 1909 are widely represented in mollusks from water bodies of the European part of Russia - 22 species of 6 genera. Of these, only one species was recorded in representatives of the bithyniid snails "*leachi*" group [10]. The trematodes of this family are characterized by the presence of an adoral disc with thorns, their number and location are similar to that of the marita. Metacercariae develop inside cysts with a two-layer membrane. The inner layer is thin, homogeneous, the outer layer is hyaline, transparent, of various thicknesses. Localization of metacercariae of trematodes Echinostomatidae in the mantle of gastropods. Metacercariae trematodes of four genera [4, 5], which are presented in this work, were found in bithyniid snails of southern Western Siberia.

Echinostoma Rudolphi, 1809 - The type genus of the family of uniting intestinal infecting birds, less often mammals. Metacercariae of this genus were previously recorded in more than two dozen species of gastropods and in five species of bivalve molluscs, as well as in dragonfly larvae [10]. In the present study, two species of this genus were found. The first species is ***Echinostoma revolutum*** Frohlich, 1808, Kanev, 1985 with a cyst diameter of 0.12-0.24 mm. and a cyst thickness of 0.023-0.27 mm. The adoral disc contains 37 thorns. The maximum

infection intensity is 1 specimen. We noted metacercariae of *E. revolutum* only in one population (**III**).Their occurrence in *B. troscheli* in samples from other water bodies in the south of Western Siberia can be up to 15.8% [8]. The second species of this genus, ***Echinostoma uralensis*** Skrjabin, 1915, has 39 thorns on the adoral disc. The diameter of the cysts is 0.151-0.176 mm, with a thinner cyst of 0.012-0.016 mm. Metacercariae of this species were noted by us in only one population (**VII**) with a maximum infection intensity of 12 specimens. The occurrence of *E. uralensis* metacercariae in *B. troscheli* in samples from other water bodies in the south of Western Siberia was slightly less frequent - 10.5% [8] than in the previous specie. In the ecosystems of Russia, these species were previously recorded in *B. tentaculata* [10]. The mollusk *B. troscheli* was recorded for the first time in Russia as the second intermediate host of this genus.

The second genus of this family is ***Echinoparyphium*** Dietz, 1909, with a wide range of definitive hosts. Representatives of four species of this genus have been recorded in the bithyniid snails of Western Siberia [4, 5]. In the present study, some of the metacercariae, which were found in five populations of *B. troscheli* (**II VIII XI XII XIII**) were not identified to species level - ***Echinoparyphium sp***. The maximum infection intensity was 12 specimens. In addition, two species of this genus have been found. The first species, ***Echinoparyphium aconiatum*** Dietz, 1909, contains 37 spines on the adoral disc. The diameter of the cysts is 0.242-0.261 mm. The cyst thickness is 0.02-0.03 mm. In our collections, *E. aconiatum* metacercariae were found in 5 populations of *B. troscheli* (**III VI IX X XI**) from both basins (Irtysh and Ob). The maximum infection intensity is 18 specimens. In Western Siberia, metacercariae of *E. aconiatum* in *B. troscheli* from the basin of Chany lake were found in 81.6% of the samples [8]. In the European part of Russia, metacercariae *E. aconiatum* have been recorded in gastropods (11 species) and bivalve (3 species) molluscs, in leeches, dragonfly larvae, tadpoles, and also in the marsh turtle [10].

The second species of this genus, ***Echinoparyphium recurvatum*** Linstow, 1873, has 45 spines on the adoral disc. The diameter of the cysts was 0.132-0.163 mm. The cyst thickness is 0.02 mm. The maximum infection intensity was 29 specimens. In the present study, metacercariae of *E. recurvatum* were found in *B. troscheli* in half of the samples (**I III VII IX XI XII XIII**). The data revealed do not contradict the data obtained earlier, since the occurrence of metacercariae of this species was 44.7% of the samples of *B. troscheli* [8]. Of the five species of the genus *Echinoparyphium* found in mollusks of the Eastern European region of Russia, three were recorded in *B. tentaculata*, and representatives of the bithyniid snails "*leachi*" group were not recorded as second intermediate hosts. However, earlier metacercariae *E. aconiatum* and *E. recurvatum* were found in of the bithyniid snails "*leachi*" group in water bodies of the steppe zone of the West Siberian

Plain [1].

The third small genus ***Hypoderaeum*** Dietz, 1909, unites intestinal parasites of birds (Anatidae, Charadrii and Rallidae). In the ecosystems of Russia, metacercariae of this genus were recorded in 9 species of gastropods and in 4 species of bivalve molluscs, as well as leeches and tadpoles [10]. One of the features of this genus of trematodes is that the adoral disc has many (49 or more) small and often falling spines. In the present study, metacercariae were identified before genus. The diameter of the cysts is 0.134-0.141 mm. The cyst thickness is 0.016 mm. Metacercariae ***Hypoderaeum sp.*** were found in *B. troscheli* in two populations (**VI** and **X**). The maximum infection intensity is 3 specimens.

The largest metacercariae of this family belong to the genus ***Moliniella*** Hübner, 1939, represented by one species ***Moliniella ansceps*** Molin, 1859. They had a cyst diameter of 0.267-0.360 mm. The cyst thickness is 0.026-0.028 mm. There are 35 thorns on the adoral disc. In the present study, *M. ansceps* metacercariae were found in two populations of *B. troscheli* (**III** and **X**). The maximum infection intensityis 4 specimens. Even in areas with a high number of final hosts - birds Rallidae family, for example, in the ecosystem of Chany lake, the occurrence of *M. ansceps* metacercariae in *B. troscheli* was 10.5% [8]. In water bodies of the European part of Russia, metacercariae of this species were recorded in 6 gastropods species, including *B. tentaculata* [10].

Marits of the fourth family **Cyclocoelidae** Stossich, 1902 are localized in the trachea, bronchi, and air sacs of birds. Representatives of this family are characterized by the second variant of secondary dixenic life cycles [7]. Since the cercariae trematodes of this family do not have locomotion organs [2], they may not leave the body of the mollusk, encysting near the rectum of the host mollusk. However, there are observations that redia can leave the shell of their first intermediate host, and move to a nearby mollusc. The metacercariae of the trematodes Cyclocoelidae develop inside globular cysts, with a relatively thick two-layer membrane. The body is rolled up into a dense ball that fills the entire cavity of the cyst. There is no oral sucker on the front of the body; it is replaced by a terminal organ. The intestinal trunks merge into an arch at the posterior end of the body. Numerous large glandular cells fill almost the entire body cavity. In the present study, the species of metacercariae was not identified - ***Cyclocoelidae gen. sp.*** Metacercariae had cysts of different diameters 0.120-0.240 mm. The entire inner space of the cyst is filled with glandular cells. The intestinal trunks are thin, diverge at an obtuse angle, parallel to the lateral edges of the body, connecting to an arch at the posterior end. Metacercariae *Cyclocoelidae gen sp.* found in eight populations of *B. troscheli* (**III V VII IX X XI XII XIII**), with a maximum infection intensityof up to hundreds of specimens. Previously, metacercariae of this family were noted only in pulmonary molluscs [2, 10]. However, in our collections, they are often found in

bithyniid snails from water bodies in the south of Western Siberia. For example, metacercariae *Cyclocoelidae gen. sp.* were noted in 26.3% of *B. troscheli* samples from the basin of Chany lake [8].

Marits of the fifth family **Cyathocotilidae** (Mühling, 1898) Poche, 1925 belong to the intestinal parasites of birds, less often mammals and reptiles. Trematodes of the family Cyathocotylidae at the metacercaria stage have been found in both vertebrates (amphibians, fish) and invertebrates (mollusks, leeches) [10]. In gastropods on the territory of Russia, two metacercariae species genus Cyathocotyle Muhling 1896 were recorded, both species were found in bithyniid snails. The metacercariae of the *Cyathocotyle* trematodes develop inside globular cysts with a thick bilayer hyaline sheath. The body of the metacercaria fills the entire space of the cyst.

Metacercariae of the first species, ***Cyathocotyle bushiensis*** Khan, 1962, are located inside thick-walled spherical cysts with a double hyaline membrane. The outer shell is dark gray, the inner one is light and transparent. The cysts with a diameter of 0.297 mm had a thickness of the outer wall layer of 0.029 mm, and of the inner layer of 0.022 mm. The diameter of the cysts and the thickness of their walls increase with the age of the metacercariae. According to our data, the diameter of young cysts varied from 0.209 to 0.254 mm (mean 0.228±0.018), mature 0.279 - 0.343 mm (0.299±0.0245), wall thickness in young cysts: 0.025-0.045 mm (0.036±0.0092); in mature: 0.057-0.065 mm (0.062±0.0035). Localization: hepatopancreatic gland. The maximum infection intensity was 25 specimens. It was shown earlier that 65.8% of *B. troscheli* collections from water bodies in the south of Western Siberia contained *C. bushiensis* metacercariae [8]. The present study confirms that *C. bushiensis* metacercariae are widespread in the bithyniid snails of Western Siberia, since they were found in 10 out of 13 populations studied (except for **II III** and **VI**). Sexually mature marita *C. bushiensis* were raised by us during the experimental infection of the downy chick *Fulica atra* bred in an incubator. The survival rate of metacercariae was 10%.

The second species of this genus, ***Cyathocotyle bithyniae*** Sudarikov, 1974, had smaller cysts (diameter 0.152 - 0.174 mm), with a shell thickness of 0.019-0.025 mm. Localization of metacercariae: muscle tissue of mollusks (leg, head, mantle fold, tentacles). In the present study, this species was found in 4 populations of *B. troscheli* (**I III VI XI**). The maximum infection intensityis 51 specimens. The occurrence of *C. bithyniae* metacercariae in *B. troscheli* in the basin of Chany lake was 73.7%. [8]. The mollusk *B. troscheli* was recorded for the first time in Russia as the second intermediate host of *C. bithyniae*. The definitive host of *C. bithyniae* trematode has not been registered in nature. Previously, maritas were grown in laboratory conditions in two out of 5 domestic ducklings [1]. We did not succeed in growing *C. bithyniae* maritas during the infection of toadstool

chicks and domestic ducklings.

Metacercariae of the sixth family **Strigeidae** Railliet, 1919 were registered in representatives of various classes of invertebrates, fish, amphibians and reptiles. Possess a wide range of reservoir hosts, including birds and mammals. On the territory of the European part of Russia, metacercariae of 4 genera were found in mollusks, but bithyniid snails were not indicated as hosts [10]. In bithyniid snails of Western Siberia, occurrence of this metacercariae family is very high. Thus, the prevalence of metacercariae Strigeidae in *B. inflate* was more than 14% [1], and they were found in 28.9% of samples of *B. troscheli* in the lake Chany basin [8]. Marita ***Cotylurus cornutus*** Rudolphi, 1808, Szidat, 1929 were grown in domestic ducklings from metacercariae found in *B. inflate* [1]. In the present study, metacercariae were found in five populations of *B. troscheli* (**I VI IX X XI**) in both regions. Metacercariae are found inside pear-shaped thick-walled cysts with a hyaline sheath. The walls of the cyst grow to the body of the metacercaria and turn into a body shell with five holes (to the suction cups, pseudo suction cups and the posterior end of the body). The maximum infection intensityis 61 specimens. Localization: in the liver of mollusks and gonads, superparasitism is often noted, i.e., when the metacercariae of *C. cornutus* encyst not in the internal organs of the mollusk, but in the sporocysts or redia of trematodes parasitizing in it. It was shown that infestation with metacercariae of this species significantly reduces the individual fertility of *B. troscheli* females [8].

The seventh family **Pleurogenidae** Looss 1899 is represented by the species ***Lacithodolfusia arenula*** Creplin, 1825. The final hosts are shepherd birds. *L. arenula* metacercariae were found in bithyniid snails from water bodies of Kazakhstan, Western Russia and Western Siberia [see review 5]. As a rule, metacercariae of *L. arenula* are recorded in a huge number of host bithyniid snails filling the entire digestive gland (5000–8500 metacercariae). Cysts are round or slightly oval with a diameter of 0.102 x 0.08 mm, with a thin elastic shell of 0.01-0.03 mm. Since the development of parthenogenetic generations and metacercariae occurs in the first intermediate host, this life cycle belongs to the second variant of secondary dixenic life cycles [7]. Earlier, in order to clarify the species belonging of the trematode, we carried out an experimental infection of a one-day-old coot chick, to which a piece of the digestive gland of a mollusk with metacercariae was fed. After 9 days, 798 mature marita *L. arenula* were found in its intestines. In the present study, metacercariae of this species were found in only one population of *B. troscheli* (**VI**), with a maximum infection intensity of 10 specimens. It was previously shown that the occurrence of *L. arenula* metacercariae is not high in 2.6% of *B. troscheli* samples, even in areas with a high abundance of coots, for example, in the ecosystem of lake Chany [8].

Similarity of species composition The similarity in the species composition

of metacercariae trematodes associated with *B. troscheli* in the Irtysh and Ob basins in the south of Western Siberia was 59%. In the Ob basin, the maximum similarity of the species composition of 27% was noted between the floodplains of the Ob and the Berdsky bay. The Jaccard index in the tributaries of the Ob river did not exceed 20%. The species composition of trematode metacercariae identified in *B. troscheli* in the Irtysh floodplain varied from 50 to 75%. The species composition of metacercariae trematodes from the lakes of the forest-bog zone coincided by 100%, but differed from the species composition from the lake of the forest-steppe zone (Kj=43%).The similarity of the species composition of the metacercariae of the trematodes of the present study and similar data on the bithyniid snails "*leachi*" groups from the water bodies of the steppe zone of the West Siberian Plain [1, 6] was 47.4%. The species composition of metacercariae trematodes that we identified in *B. troscheli* in the Irtysh and Ob basins and information associated with *B. leachi* from water bodies of the European part of Russia [10] showed 20% similarity.

Thus, the study revealed that the bithyniid snails "*leachi*" groups from the water bodies of the Irtysh and Ob basins were found to have significantly more metacercariae trematodes species than in European water bodies of Russia.

References

1. Filimonova L.V., Shalyapina V.I. 1979. Metacercariae in the snails Bithynia inflate in Severnaya Kulunda lakes. In Helminths of animals and plants. Moscow:Nauka, 29: 157-166 (In Russian).

2. Ginetsinskaya T.A.1954 Life cycle and biology of developmental stages Cyclocoelum microstomum (Trematodes). Leningrad Uchenye Zapiski LGU, seria biological 35(172): 90—113 (In Russian).

3. Kulakova A.P. 1982 New data on Asymphylodora progenetica- Parasymphylodora progenetica (Trematoda, Monorchidae) Parazitologiya, 16 (1): 78-81(In Russian).

4. Serbina E.A. 2002. Bithyniidae Snails in Water Bodies in the South of West Siberia and Their Role in the Life Cycle of Trematodes. PhD. Novosibirsk 162 pp. (In Russian).

5. Serbina E.A. 2010. Coevolution of the Host - Parasite systems (Bithyniidae-Trematode). Biodiversity and Ecology of Parasites. [Editor-in-Chief: S.A. Be`er]. Transactions of Center for Parasitology Moscow:Nauka, Vol. 46: 239-259 (In Russian).

6. Serbina E.A. 2011. Role Bithyniidae snails (Gastropoda: Prosobranchia) as second intermediate hosts of trematode the river Karasuk and Krotovo lake (the south of the Western Siberia, Russia). Biologicheskie Nauki Kazakhstana 2: 51-60. (In Russian).

7. Serbina E.A. 2013. Variety dixenic life cycles of trematode from Bithyniidae snails (Mollusca: Gastropoda: Prosobranchia) Palaearctic. Russian parazitologiya zhurnal 3: 49-57 (In Russian).

8. Serbina E.A. 2014. The influence of trematode metacercariae on the individual fecundity of Bithynia troscheli (Gastropoda: Bithyniidae). Parazitologiya, 48 (1):3-19.

9. Starobogatov Ya.I. 1977. Class Gastropoda, in Identification Key to the Freshwater Invertebrates in European USSR, Leningrad: Gidrometeoizdat. p.152–174. (In Russian.).

10. Sudarikov V.E., Shigin A.A., KurochkinYu.V., Lomakin V.V., Stenko R.P. Yurlova N.I. 2002. Metacercariae trematodes parasites of freshwater hydrobionts in Central Russia. Moscow: Nauka p.139-187 (In Russian).

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CERCARIAE OF TREMATODES FROM *BITHYNIA TENTACULATA* (GASTROPODA: BITHYNIIDAE) IN THE CHANY LAKE BASIN (WESTERN SIBERIA, RUSSIA)[1]

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Abstract. *On the basis of fifteen years long probing, the species composition of trematode cercariae associated with prosobranch mollusks Bithynia tentaculata in the basin of lake Chany, the largest in the Western Siberia (Novosibirsk region), was estimated. There are 16 species cercariae of trematodes of 9 families. For the first time, in the basin of lake Chany, on the estuarine sections of the Kargat river, a local focus of metorchidosis was discovered, which is dangerous not only for birds, but also for people.*

Keywords: *cercaria, trematode, Metorchis bilis, Opisthorchidae, bithyniid snails, Bithyniidae, Western Siberia, Novosibirsk region.*

Parasites are an integral part of biocenoses. The abundance and distribution of the final and intermediate hosts, which is closely related to the characteristics of the reservoir and the diversity of biotopes in it, can be regarded as the main factors determining the diversity of the trematodofauna. It was previously shown that trematodes parasitizing in mollusks of the family Bithyniidae at the parthenite stage are characterized by a narrow specificity in relation to the first intermediate host, while metacercariae are characterized by polyhostality [7].The specificity of the trematodes to the hosts can be of both ecological and phylogenetic nature. The freshwater bodies of the Palaearctic are inhabited by Gastropoda of two subclass-

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es, which differ significantly in phylogenetic age: primary water - Prosobranchia (in particular, mollusks of the family Bithyniidae) and secondary water - Pulminata.

Bithynia tentaculata (L., 1758) – are prosobranch bisexual molluscs, widespread in freshwater reservoirs of the Palaearctic. They prefer low-flow reservoirs. Their life expectancy does not exceed five years [3]. Most individuals reach puberty in the third year of life [4]. They spend the winter period in the ground of reservoirs. The shell height of the largest bithyniid snail reaches 15 mm. The parasite fauna of *B. tentaculata* is highly diverse, which may be related to the primary water availability of this species. To date, information characterizing the Bithyniidae - Trematoda system can be obtained from works devoted to the study of the fauna of freshwater gastropods trematodes in individual water bodies. For example, studying the species diversity of trematode cercariae in 27 species of mollusks from inland water bodies of the Curonian Spit and from the Curonian Lagoon, the authors of [1] came to the conclusion that the greatest diversity was recorded in *B. tentaculata*. The second group of sources is research on the biology of trematodes of the same family. For example, special attention was focused - on the family Opisthorchidae, as parasites that are dangerous to human health and carnivores. The third group of sources is research on the study of the life cycles of certain species of trematodes (for example, the work of Yu.V. Belyakova, or E.M. Karmanova).Works reflecting information on the species composition of trematodes associated with mollusks of the family Bithyniidae, and *B. tentaculata*, in particular, are rare [1, 5]. Thus, at least 16 species of trematode cercariae have been recorded on the western border of the *B. tentaculata* range. In the Western Siberia, where the eastern border of the *B. tentaculata* range lies, information on their abundance, infestation, and species composition of parasitizing trematodes is practically absent. This study is devoted to the species diversity of trematode cercariae identified in *B. tentaculata* in the basin of lake Chany, the largest in the Western Siberia.

In spring and especially in autumn, large flocks of migratory birds stop at lake Chany. More than 70 species of birds remain for nesting in the area of this water basin [13]. It is the birds that play the role of the final hosts of the trematodes found in this study.

Materials and methods

The species affiliation of trematodes at the parthenite stage was determined by the morphological structure of living cercariae that independently left the first intermediate host. For this purpose, all collected *B. tentaculata* were individually placed in transparent cells of immunological plates with a capacity of 3-5 ml, which were previously filled with filtered river water and left for 1-2 hours. Then the water in the container was examined, without removing the molluscs, under a 16-fold magnification of the "MBS-10" binocular, after which the mollusks were transplanted into new containers with clean river water. Observations were carried out for at least 24 hours. In some individuals, observations of the emission of cer-

cariae were carried out for several days. Live cercariae were stained with 0.01% vital dyes (neutral red and Nile blue sulfate). Measurements of cercariae were carried out after fixing them with acetic acid carmine. Temporary preparations were cleared with glycerin. When determining the cercariae, we used the works of Russian and foreign authors mentioned by us earlier [7]. 653 *B. tentaculata* were investigated by compressor.

Results

The infection rate with *B. tentaculata* was 11.18%. *B. tentaculata* played the role of the first intermediate host for trematodes of 9 families. One third of infected *B. tentaculata* (33%) had parthenogenetic generations of representatives of the Prosthogonimidae family, 26.4% - of the Notocotylidae family. The shares of the families Lecithodendriidae and Pleurogenetidae were also significant (12-14%). The incidence of trematodes of other families among infected individuals is low (1-3%).

Trematodes parasitizing in *B. tentaculata* can be divided into two groups, differing in the characteristics of the reproduction biology of parthenogenetic generations. The first group includes species in which parthenogenetic generations are represented only by sporocysts (mother and daughter). Of the trematodes of this group, only representatives of Xiphidiocercariae were found in *B. tentaculata* from the basin of lake Chany. This is not a taxonomic group of small free-living larvae of trematodes. S.V. Shchenkov et al. [11] showed that a set of morphological characteristics of cercariae allows one to identify representatives of four families. According to our data [5], parthenogenetic generations of Xiphidiocercariae are localized mainly in the gonad and along the excretory ducts of the reproductive system. Penetration into the liver region occurs, apparently, only at the last stages of the development of parthenogenetic generations.

The most widespread family from the Xiphidiocercariae group is **Prosthogonimidae** Lühe, 1909. At present, 39 species of birds are known in the basin of lake Chany, which play the role of the final hosts of trematodes of the family Prosthogonimidae [6]. Approximately 1/4 of the chicks are infected with prostogonyms. Using the method of intravital diagnostics of bithyniid snails infection with trematode parthenites, we were able to reveal the seasonality of the emission of cercariae of this family. Bithyniid snails, capable of emitting cercariae, are usually found from the first ten days of June to mid-July. In the third ten-day period of July, a single sighting was recorded, and in August such individuals were not found even once. Our quantitative assessment of the average daily emission of cercariae from trematodes of this family revealed that the flow of cercariae positively correlates with the water temperature in the reservoir for the third ten-day period of June (r=0.71) [6]. The invasiveness of Prosthogonimidae metacercariae occurs only two months later, which is probably why cercariae that entered the water

bodies of the south of the Western Siberia in August do not have time to complete their life cycle in the current year. In the basin of lake Chany *B. tentaculata* infected with trematodes Prosthogonimidae were found in 2004-05 and 2012. Infected females were found more often than males (5:3 ratio).The discovered parthenites and cercariae of trematodes of this family belong to two genera: *Schistogonimus* Lühe, 1909 and *Prosthogonimus* Lühe, 1909.The first genus is represented by one species ***S. rarus*** Braun, 1901 (syn.: *Cercaria rumniensis* Pike, 1967).The proportion among infected *B. tentaculata* was 9.9%. *B. tentaculata* infected with *S. rarus* trematodes had a shell height of 9.24 to 11.98 mm. The second genus is represented by two species ***P. cuneatus*** Rudolphi, 1809 (syn.: *C. helvetica XI,* Dubois) and ***P. ovatus*** Rudolphi, 1803. The shell height of *B. tentaculata* infected with *P. cuneatus* varied from 9.56 to 9.94 mm. The proportion of those infected with *B. tentaculata* was 5.5%. The shell height of specimens infected with trematodes *P. ovatus* ranged from 9.24 to 11.98 mm. Their share among those infected with *B. tentaculata* was 4.4%.

It should be recalled that many representatives of Xiphidiocercariae have a reservoir of mucoid secretion (virgula) in the oral sucker. This morphological feature was noted in representatives of several families [11]. In the present study, representatives of two families were found.

Among those infected with *B. tentaculata*, the proportion of the family **Pleurogenetidae** Looss, 1898 was 13.2%. In the basin of lake Chany *B. tentaculata* infected with trematodes Pleurogenetidae were found in 2005 and in 2012-13. Trematodes of this family were represented by two species **Laterotrema** (*Lecithodollfusia*) **arenula** (Creplin, 1825) Odening, 1964 and ***Pleurogenes medians*** Olsson, 1876 (syn.: *Cercaria helvetica VIII*). The main part belonged to the first species. It should be noted that, as a rule, *L. arenula* trematodes were found already at the metacercaria stage.Their number is so great that they often replace all organs of the host. The huge values of the invasion intensity indicate that the studied mollusks played the role of not only the second intermediate host, but also the first one. Probably, some of the cercariae leave their first host; however, we have not been able to register the timing of the *L. arenula* emission to date. Since the lifespan of metacercariae has no seasonal restrictions, infected with B. tentaculata were found in different months from May to August. This may be related to the high proportion of *B. tentaculata* infected. The minimum shell height of *B. tentaculata* infected with *L. arenula* metacercariae is 8.7 mm. The ratio of infected females to males was the same (1:1). We found *L. arenula* marites earlier in Eurasian coot [9]. The final host of the second species is amphibians. Observations of the emission of *P. medians* cercariae were carried out from June 30 to July 5. The shell height of the infected mollusk was 10.51 mm.

Among those infected with *B. tentaculata*, the proportion of representatives

of the third family **Lecithodendriidae** Odhner, 1911 was 12.1%.To date, there is a description of more than a dozen varieties of cercariae of this family (with conventional names) found in bithyniid snails, which is associated with insufficient knowledge of their life cycles [see review 7]. It should be noted that parthenogenetic stages of Lecithodendriidae in different parts of the Palearctic were found only in prosobranch mollusks. In the basin of lake Chany, *B. tentaculata* infected with trematodes ***Xiphidiocercaria sp.1*** Odening, 1962 were found in 1995, 2005 and 2012-13. They had a shell height from 6.89 to 12.45 mm. Infected males are found more frequently than females (1:2 ratio).

Representatives of the fourth family **Plagiorchiidae** Lühe, 1901 were found once in August 2005 during the dissection of *B. tentaculata* with a shell height of 10.7 mm. In contrast to the representatives of Xiphidiocercariae mentioned above, the number of cystogenic cells of this species exceeded 4 pairs. The role of the first intermediate hosts for trematodes of the family Plagiorchiidae, as a rule, is played by pulmonary mollusks. However, there are isolated indications of the discovery of parthenitis and cercariae ***Plagiorchis arcuatus*** Strom 1924 in *B. tentaculata* [see review 7]. Perhaps we found this species.

In representatives of the second group of trematodes, parthenogenetic generations were represented by sporocysts and redia (mother and daughter). The ratio of the latter depends on the seasonality and condition of the host mollusk. During the summer season, there can be a change in the periods of hatching of redia and periods of emission of cercariae. Among those infected with *B. tentaculata*, the share of trematodes of the second group was 37.4%. In the basin of lake Chany, representatives of five families of trematodes of this group were found in *B. tentaculata*. Most of them belonged to the family **Notocotylidae** Lühe, 1909. *B. tentaculata* infected with notocotilides were found in 1996, 2003-05 and 2012-13. Mother redia are found, as a rule, in the hepatopancreas of bithyniid snails. Daughter redia notocotilides are localized in the gonad region, and begin to spread along the genital tract. By the beginning of the emission of cercariae, more and more severe damage to the gonad occurs, up to its complete reduction. Infected females are found more frequently than males (2:1 ratio). In the south of the Western Siberia, the emission of Notocotylidae cercariae was recorded throughout the summer season, stopping at 14^0C. In the reservoirs of Eastern Europe (Russia), this period is almost twice as long from the end of April to the end of October [5]. The discovered parthenites and cercariae of trematodes of this family belong to two species of the same genus. Partenites and cercariae of ***Notocotylus parviovatus*** Yamaguti, 1934 (syn.: *N. chionis* Baylis, 1928) were found in *B. tentaculata* with a shell height of 8.8 - 10.14 mm. Their share among those infected with *B. tentaculata* was 6.6%. The frequency of parthenitis and cercariae of the second species ***N. imbricatus*** (Looss, 1893), Szidat, 1935 was 4.4% among those infected with *B. tentaculata*. The shell

height of the infected individuals was 8.9 - 9.97 mm.

Representatives of the family **Psilostomidae** Odhner, 1913 parasitize in the intestines of birds, less often mammals and reptiles. The topography of the internal organs of the marita is similar to that of Echinostomatidae, however, they do not have an adoral disc. Sporocysts and maternal redia of psilostomids, unlike notocotilids, are localized in the region of the gonad, then daughter redia almost completely occupy the gonad and hepatopancreas and begin to spread along the genital tract. The emission of Psilostomidae cercariae, as well as representatives of the previous family, was noted throughout the summer season (from mid-June to mid-August). The daily emission of cercariae can be detected from 7 to 19 hours, however, about 70% of the daily output is noted in the middle of the day from 12 to 15 hours.In *B. tentaculata* weighing 402 mg with a shell height of 13.8 mm, the maximum daily yield was 391 cercariae. Quantitative indicators decreased almost fivefold from June to August. Cercariae have positive phototaxis, but avoid direct sunlight and rush into shaded areas. Their encysting took place on the shell of the host mollusk (outer and inner sides) or duckweed, but more often on the bottom and walls of the Petri dish. The life span of cercariae is from 10 minutes to 2.5 hours.In the basin of lake Chany *B. tentaculata* infected with trematodes Psilostomidae were found in 1996, and in 2012-13. However, the proportion of such individuals among all infected individuals is not large - 3.3%. The discovered parthenites and cercariae of trematodes of the family Psilostomidae belong to two genera. In the Western Siberia, the genus *Psilotrema* was represented by two species: *P. simillium* (Muhling, 1898) Odhner, 1913 and ***P. tuberculata*** (Filippi, 1857) Muhling, 1898 more than the abdominal one (ratio 1.0: 0.8), while in *P. simillium* they are approximately equal. Individuals infected with *P. tuberculata* trematodes were found in 2012 and 2013. Their shell heights were 9.94 mm and 11.28 mm. In cercariae of the second genus, *Psilochasmus*, the tail exceeds body length and bears a swimming membrane. Both suckers are well developed. The excretory canals are filled with granules in several rows. A canal departs from the excretory bladder into the tail, bifurcating in its anterior third. In the Novosibirsk region, the genus is represented by one species - ***Psilochasmus oxyurus*** (Creplin, 1825). Infected *B. tentaculata* (8.3 mm) was detected only once in June 1996. Single cercariae were noted (maximum 5 specimens per day).

Marits of the next family **Echinochasmidae** Odhner 1911 were found in the intestines of near-water birds [10] Infected *B. tentaculata* were found in 2005 and 2012. Their share among all infected people was 3.3%. The genus *Echinochasmus* was represented by one species, ***E. coaxatus*** (Dietz, 1909). The shell height of the infected female was 12.37 mm. We managed to observe the daily emission of these cercariae from June 19 to June 23, 2005.The maximum daily emission of *E. coaxatus* was 150 cercariae per day, at a temperature of 23^0C. In other cases, the

species was not identified due to the absence of mature cercariae.

Marits of the eighth family **Cyclocoelidae** Kossack, 1911 parasitize in the chest cavity and air sacs of birds. In the ecosystem of lake Chany, we found *Cyclocoelum sp.* in the body cavity Eurasian coots [9]. The morphological features of the cercariae of this family include the absence of a tail. The entire body of *Cercarieum* is filled with many glandular cells with dark granular contents. The suction cup is devoid of muscle elements and consists of large vesicular cells. The closed intestine forms a flattened arch, characteristic of this family, at the posterior end of the cercariae body. The excretory system is represented by two clearly visible lateral canals that merge at the posterior end of the body into a pear-shaped bladder. In *B. tentaculata*, the examined population, daughter redia of trematodes of the Cyclocoelidae family were found in two males (shell height 10.17 and 10.48 mm) at dissection. Both molluscs were found in 2005 (June and July). Earlier, pulmonary molluscs were noted as the first intermediate hosts Cyclocoelidae [7]. *B. tentaculata* as the first intermediate hosts of trematodes of the Cyclocoelidae family were noted for the first time.

Unlike all the species mentioned above, maritas of the family **Opisthorchidae** (Lass, 1899) Braun, 1901 pose a danger not only to birds, but also to carnivorous mammals and humans. However, there is very little information about the bithyniid snails - opisthorchidae system. This is partly due to the rare occurrence of infected bithyniid snails in natural ecosystems, and the high labor intensity of these studies. In particular, there is virtually no information on the localization of parthenogenetic stages in the host mollusk. According to our observations, local hemipopulations of trematodes of the genus *Metorchis*, which are at the earliest stages of development, were found in the liver of *B. tentaculata*. Daughter generations of parthenitis penetrate into the gonad, and somewhat later spread along the genital tract. Examination of individuals in which emission of cercariae of the genus *Metorchis* was observed revealed severe damage to the gonad, but its complete reduction was noted only in half of the cases [5]. Opisthorchiasis is recorded practically throughout the entire territory of Novosibirsk Oblast; however, for a long time, the absence of a focus of opisthorchidosis was noted in the ecosystem of lake Chany [2]. Isolated cases of registration of trematodes of the family Opisthorchidae were noted earlier in birds or fish. Since these facts were isolated, this suggests that the presence of marites and metacercariae of opisthorchids could be associated with migrations of birds, or the result of acclimatization of valuable commercial species of cyprinids. In June 2012, we were able to observe the daily emission of cercariae ***Metorchis bilis*** (Braun, 1890) (syn.: *M. albids* Braun, 1893). The shell height of the infected female was 14.39 mm. Quantitative registration of cercariae was carried out from 19 to 23 June. The maximum daily emission was 6672 cercariae per day. Earlier, we showed that the emission of cercariae of the

family Opisthorchidae can continue until the beginning of August. The survival rate of *M. bilis* metacercariae in juvenile cyprinids varied from 2 to 58% with an intensity of up to 29 metacercariae. Considering this information, only this one mollusk could infect from 184 to 5338 fry by August. The following year, no emission of this family of cercariae could be detected; however, we found Opisthorchidae redia in a male *B. tentaculata* in August 2013 with a shell height of 10 mm. The presence of parthenogenetic stages of *M. bilis* indicates a local focus of metorchoses in the basin of lake Chany, which is a potential danger to humans.

Discussion

As a result of the studies carried out, 16 species cercariae of trematodes of 9 families were found in B. tentaculata from the basin of the lake Chany, the largest in the Western Siberia. Representatives of the family Plagiorchiidae were first recorded in the bithyniid snails in the Western Siberia. For trematodes of the family Cyclocoelidae, mollusks of the family Bithyniidae were recorded as the first intermediate hosts ones for the first time in the Russia. It should be noted that parthenites of trematodes of six families (Opisthorchidae, Echinochasmidae, Psilostomidae, Prosthogonimidae, Pleurogenetidae, Lecithodendriidae) out of nine identified in *B. tentaculata* were previously recorded only in prosobranch mollusks. No information has been found on the presence of representatives of these families in pulmonary molluscs [7].

The specificity of the parthenite of the trematodes of these families may be related to the antiquity of the existing system of **bithyniid snails – parthenites of trematodes**.The process of coevolution of the **Host-Parasite system** is rather long, therefore, phylogenetically older groups of parasites are strictly confined to their hosts, which was previously shown on the example of the system: **Fish - Parasites**. According to S.S. Shulman's [12] parasites of ancient fish never pass to phylogenetically younger groups of fish, while ancient fish themselves can sometimes become hosts of parasites from younger groups. This is probably why parthenites of trematodes, characteristic of the phylogenetically younger group Pulminata, can develop in Prosobranchia (phylogenetically older ones). However, their occurrence is rare (for example, Cyclocoelidae or Plagiorchiidae).

Analysis of the dynamics of the distribution of parthenitis of the examined trematode species in *B. tentaculata* makes it possible to distinguish three groups. The first group includes trematodes of the Xiphidiocercariae group, primarily affecting the gonad of the host. Species infecting the liver first (representatives of the families Opisthorchiidae, and Notocotylidae) are referred by us to the second group. The third group includes parthenites of trematodes of the family Psilostomidae, the early stages of development of which are found both in the liver and in the gonad of the mollusk host. This information is of great practical importance, since it must be taken into account when searching for local foci of opisthorchiasis.

Difficulties in diagnosing representatives of the families Opisthorchiidae, and Notocotylidae are due to the fact that cercariae of both families have morphological similarities, for example, they have a simple tail, pigmented eyes, and the presence of one sucker (oral only). If we study mature cercaria (which independently left the first intermediate host), then the trematodes of these families differ well in terms of a set of characters. In particular, the cercariae of Opisthorchiidae have **two** rectangular pigmented ocelli, the presence of glands of penetration, the tail of the cercariae has a swimming membrane, and is 2 times longer than the body. According to our observation, during the day, the emission of opisthorchid cercariae is limited in time and is confined mainly to noon hours. The duration of their active movement is more than 24 hours. In addition, the seasonality of their emission was noted (from late June to early August). The emission of Notocotylidae cercariae was recorded throughout the summer season (in the south of the Western Siberia from May to August). The emission of cercariae notocotilide was noted during daylight hours, the onset - both in the morning and in the evening. In our opinion, this is due to the physiological state of the host mollusk. The duration of active movement of Notocotylidae cercariae does not exceed several hours, although the tail can remain active until the next morning. Cercariae of Notocotylidae have **three** oval or round pigmented eyes. However, sometimes in cercariae Notocotylidae the third ocellus is very weakly expressed or not at all visible in specimens in redia. Therefore, the absence of a third ocellus cannot be considered decisive in species diagnostics. It should be emphasized that parthenogenetic stages of representatives of trematodes of both families have the same localization in bithyniid snails, which complicates their diagnosis at the stage of redia. The ability to diagnose not only the cercariae of opisthorchids and notocotilide, but also their parthenogenetic stages will make it possible to more accurately identify local foci of dangerous epidemic and epizootic diseases caused by these trematodes.

Thus, the results obtained showed that in the basin of the largest lake in the south, the Western Siberia, B. tentaculata play the role of the first intermediate host for both specific species of trematodes and for trematodes characteristic of pulmonary mollusks younger phylogenetically group. Since, in one ecosystem, pathogens of an epidemically dangerous disease (opisthorchiasis) and pathogens epizootic (of the disease birds) can simultaneously exist, only their correct species diagnosis will allow identifying local natural foci of opisthorchidosis when examining infected bithyniid snails.

References

1. Bykhovskaya-Pavlovskaya, I.E. Kulakova, A.P. 1971. Cercariae from Bithynia (Bithynia tentaculata and B. leachi) in Curonian Lagoon. Parazitologiya 5(3):222-232 (In Russian).

2. Karpenko SV., Chechulin AI., Yurlova NI., Serbina EA., Vodyanitskaya SN., Krivopalov AV., Fedorov KP. 2008. Characteristic of Opisthorchosis foci in the Southern of West Siberia. Contemporary Problems of Ecology. 1(5): 517–521.

3. Kozminsky EV. 2003. Growth, demographic structure of population and determination of Bithynia tentaculata (Gastropoda, Prosobranchia) age. Zoologicheskii Zhurnal. 82, 5: 567-576. (In Russian).

4. Kozminsky EV. 2003. Seasonal dynamics of reproduction and reproductive parameters of Bithynia tentaculata (Gastropoda, Prosobranchia) Zoologicheskii Zhurnal.82, 3: 325-331. (In Russian).

5. Kozminsky EV. 2012. Effect of Trematode Invasion on the Fecundity of Bithynia tentaculata (Gastropoda: Bithyniidae). Biological Sciences in Kazakhstan. №4. 45-53. (In Russian).

6. Serbina EA. 2008. Characteristics of the seasonal development of Schistogonimus rarus (Trematoda:Prosthogonimidae). An essay on quantitative estimation of the trematode in the ecosystem of the MalyeChany lake (south of Western Siberia). Parazitologiya 42(1): 53–65. (In Russian).

7. Serbina EA. 2010. Coevolution of the Host - Parasite systems (Bithyniidae-Trematode). Biodiversity and Ecology of Parasites. Transactions of Center for Parasitology. Moscow:Nauka 46:239-259 (In Russian).

8. Serbina EA. 2016.Cercariae Opisthorchis felineus and Metorchis bilis from first intermediate hosts for the first time in basin of Chany lake (Novosibirsk region, Russia) is found. Russian Journal of Parasitology, 37(3): 421–429. DOI: 10.12737/21809 (In Russian).

9. Serbina EA. 2018. Trematodes mature in the aquatic birdsfrom the Chany lake (South of West Siberia). Thebiodiversity of parasites the International Conf., in Moscow, Russia at the Center of Parasitology of Severtsov IEE RASp. 234-235. ISSN 0568-5524. (In Russian).

10. Serbina EA, Kozminsky EV. 2020. Biology of trematodes of the subfamily Echinochasminae Odhner, 1910 in ecosystems of the south of Western Siberia. International University Science Forum Science Education Practice Toronto, 165-175 DOI 10.34660/INF.2020.49.30.020

11. Shchenkov SV, Denisova SA,Kremnev GA, Dobrovolskij AA. 2019. Five new morphological types of virgulate and microcotylous xiphidiocercariae based on morphological and molecular phylogenetic analyses. Journal of Helminthology 1–12. https://doi.org/10.1017/S0022149X19000853

12. Shulman SS. 1958. Specificity of fish parasites.In Basic problems of fish parasitology. Leningrad: LGU. p. 109-121. (In Russian).

13. Yurlov K.T. 1981. Species composition of birds and their habitat distribution in Barabinskaya Lowland (Western Siberia). In Ecology and biocoenotical connections of migratory birds in West Siberia. Novosibirsk: Nauka (Siberian Branch). p. 5–29. (In Russian).

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SYNTHESIS AND ANALYSIS OF SALTS BASED ON OLEIC ACID AND DIETHYLETRIAMINE

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Abstract. *The current scientific work contains detailed information on the synthesis and some properties of the products obtained from the reaction between oleic acid and diethylene triamine. The composition and structure of the reaction products were identified by NMR spectroscopy. Some physical and chemical indicators of the synthesized compounds were determined, surface-active parameters were calculated, petrocollecting and petrodispersing properties were studied. In the end, the final recommendations were given, taking into account the applied properties of the salts.*

Keywords: *surfactants, oleic acid, diethylenetriamine, petrodispersing, petrocollecting*

Introduction

Thus, the oil layer creates an additional environment between air and water, preventing the dissolution of oxygen in the air, and the sun's rays entering the lower aquifers of the oceans and seas. The vital activity of flora and fauna within water basins, which cannot be enriched with oxygen and deprived of sunlight, is weakening. One of the most important branches of chemistry is the rapid accumulation of thin layers of oil in order to preserve the balance of nature. To do this, various surfactants are synthesized and investigated. About 10% of the demand for surfactants (more than 12 million tons) falls on nitrogen compounds. Although such substances have been known for about 50 years, they have been used more in the last 20 years due to their high efficacy surfactants. When surfactant collects oil from the water surface, the negative impact on the environment is relatively reduced [1-3].

There are different tools and techniques which specialists can employ to contain or remove oil from the environment when an oil spill occurs such as booms and skimmers [4]. However, those mechanical clean-up activities can never remove thin layer of oil remaining on the surface. Surfactants can be the very effective solution to this problem. Surfactants lower the surface and interfacial tension between two media because of their specific characteristics [5-8].

Purpose of the study

The present work is dedicated to obtainment and study of new surfactants based on oleic acid and diethylene triamine. It is aimed to analyse if obtained surfactants are applicable for clean-up activities for oil spills.

Material and methods

Relevant salts in two different proportions were synthesized as a result of a reaction based on oleic acid and diethylene triamine. The first salt was obtained from the reagents in equimolar proportions at 60-65 degrees Celsius for 9-10 hours. The other substance was the product of a 2: 1 reaction of oleic acid and diethylene triamine at a temperature of 55-60 ^{0}C. The reaction schemes are as follows:

1:1 $NH_2-CH_2-CH_2-NH-CH_2-CH_2-NH_2 + C_{17}H_{33}-COOH \rightarrow NH_2-CH_2-CH_2-NH-CH_2-CH_2-NH_2\cdots HOOC-C_{17}H_{33}$

1:2 $NH_2-CH_2-CH_2-NH-CH_2-CH_2-NH_2 + 2C_{17}H_{33}-COOH \rightarrow$

The structure and composition of obtained salt were confirmed with NMR-spectroscopy in Figure 1,2 for ^{1}H NMR of Salt 1 and Salt 2 and Figure 3,4 for ^{13}C NMR of Salt 1 and Salt 2 respectively.

Results of ^{1}HNMR data. ***For Salt 1 (Fig. 1)*** **-** ^{1}H NMR (BRUKER-Fourier 300.18 MHs, Asetone-D6, δ, ppm.): 0.88 (t., 3H, CH_3), 1.23-1.41 (m., 20H, CH_2),1.57 (m., 2H, CH_2), 2.19 (t., 2H, CH_2COO), 2.60-3.12 (m., 12H, CH_2-NH,

CH_2-CH=), 5.36 (m., 2H, CH=CH)

Results of ^{1}HNMR data. For Salt 2 (Fig. 2) 1H NMR (BRUKER-Fourier 300.18 MHs, Asetone-D6, δ, ppm.): 0.89 (t., 6H, CH3), 1.22-1.41 (m., 40H, CH2), 1.59 (m., 4H, CH2), 2.23 (t., 4H, CH2COO), 2.45-3.53 (m., 16H, CH2-NH, CH2-CH=), 5.36 (m., 4H, CH=CH)

Results of ^{13}C data. ***For Salt 1(Fig. 3)*** ^{13}C NMR ppm.: 13.49 (CH_3), 22.44, 25.36, 26.91, 31.74, 34.91 (CH2), 129.67 (CH=CH)

Results of ^{13}C data. ***For Salt 2(Fig. 4)*** ^{13}C NMR ppm.: 13.49 (CH3), 22.45, 25.10, 25.38, 26.92, 31.75, 34.49, 35.84 (CH_2), 127.89, 129.67 (C^{13}C NMR ppm.: 13.49 (CH_3), 22.45, 25.10, 25.38, 26.92, 31.75, 34.49, 35.84 (CH_2), 127.89, 129.67 (CH=CH),127.89, 129.67 (CH=CH)

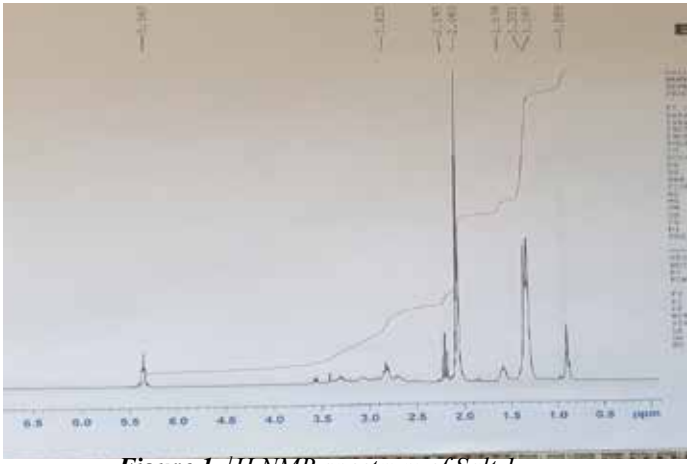

Figure 1. *^{1}H NMR spectrum of Salt 1*

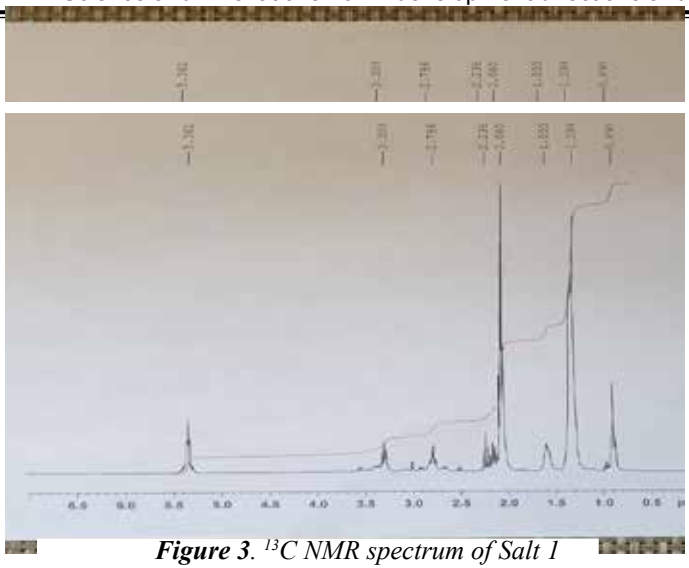

Figure 3. *^{13}C NMR spectrum of Salt 1*

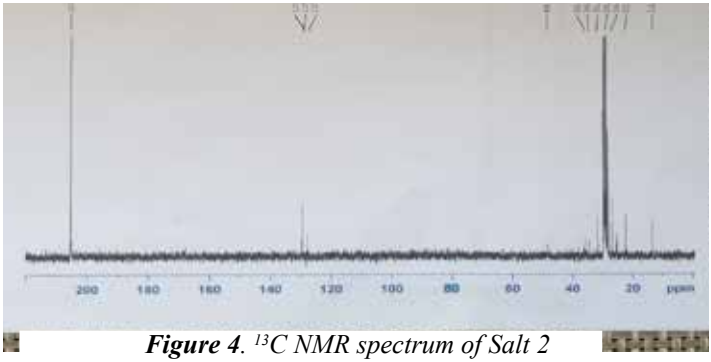

Figure 4. *^{13}C NMR spectrum of Salt 2*

The melting point of the Salt1 and Salt2 are 62° and 58° respectively. Both products have good solubility in ethanol and acetone. Salt 1 is brownish, viscous liquid, while Salt 2 is lighter and more viscous substance than Salt 1. Amin number is 86 mgHCl/g for Salt1 and 45 mgHCl/g for Salt 2. Throughout various experiments surface activity parameters and specific electrical conductivity values/ thermodynamic properties of the synthesized surfactants were determined and the graphs were plotted and described in Figure 5. Using the data obtained from Fig.5, surface activity parameters of the synthesized surfactants were determined using the method given in [3]

Results and discussions

Critical Micelle Concentrations (CMC) of the obtained salts were determined as $0.00194*10^{-4}$ and $0.00112*10^{-4}$mol/l respectively. Besides that, γ_{CMC}, surface pressure (π_{CMC}), C_{20} (the concentration for decrement of γ by 20 mN/m), adsorption efficiency ($pC_{20} = -logC_{20}$), as well as CMC/C_{20} (interfacial activity) parameters of obtained surfactants were determined.

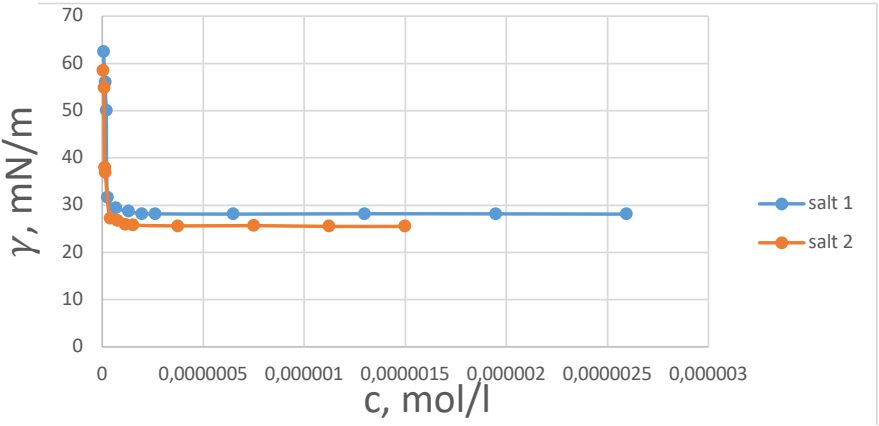

Figure 5. *Surface tension at water-air interface versus concentration of the obtained salts at 26˚C*

Maximum surface excess concentration (Γ_{max}) and minimum area of one surfactant molecule at water-air border (A_{min}) were calculated using the given equations

$$\Gamma_{max} = \frac{1}{n * R * T} * \lim_{c \to CMC} \frac{d\gamma}{dlnc}$$

where n is the number of dissociated ions which is 2 and 3 respectively for Salt 1 and Salt 2, R is universal gas constant (8.314 J/mol*K) and T is absolute temperature;

$$A_{min} = \frac{10^{16}}{N_A * \Gamma_{max}}$$

The surface activity parameters were tabulated in Table 1.

Table 1.

Surface activity parameters of the synthesized surfactants

Surfactant	CMC*10^4 (mol/L)	γ_{CMC} (mN,m)	π_{CMC} (mN,m)	C_{20}*10^4 (mol/L)	pC_{20}	CMC/C_{20}	Γ_{max}*10^{10} (mol/cm^2)	A_{min}*10^2 (nm^2)
Salt 1	0.00194	28.17	43.87	0.000162	7.79	12	2.031	81.77
Salt 2	0.00112	25.93	45.09	0.000075	14.97	8.18	1.29	129.21

As it seems from the Table 1, Salt 2 which is the gemini surfactant has a lower CMC value which is more desirable for surfactants. Besides that, the minimum area for one molecule of salt 2 surfactant is less than salt 1, which is also preferable.

Petrodispersing and petrocollecting properties of the surfactants was determined according to the known procedure described in [2]. 40 ml of water are placed in a Petri dish. 1 ml of crude oil (in this work, Pirallahi) is spread over the water (thickness of the film is ~ 0.17 mm). Then, 0.02 g of the surfactant (or its 5% wt. solution) is added to the film from the side wards. The surface area of the initial oil film and current areas of the formed oil slicks are measured at certain time intervals. The coefficient K_d - denoting the degree of the surface cleaning is calculated (in %).

Table 2

Petrodispersing and petrocollecting properties of the synthesized surfactants

Ratio	State of surfactant	Sea water		Tap water		Distilled water	
		K_d	Duration-τ, hours	K_d	Duration-τ, hours	K_d	Duration-τ, hours
1:1	*5 wt. % aqueous solution*	86.7%	0-20	10	0-3	12.3	0-3
		80.2%	20-72	15.1	3-5	74%	3-16
		70%	72-216	87%	5-20	84%	16-260
		68%	216-312	2.67	20-72	spilling	
		spilling		1.92	72-264		
				spilling			

Continuation of Table 2

	5 wt. % ethanolic solution	88%	0-20	90%	0-23	12.3	0-3
		80%	20-72	6.4	23-51	18.02	3-5
		2.04	72-240	1.96	51-243	6	5-21
		drying		spilling		84%	21-145
						spilling	
	Solid	95%	0-1	11	0-1	8.5	0-19
		86%	1-17	13.75	1-3	spilling	
		15.4	17-141	92%	3-43		
		6.41	141-237	spilling			
		spilling					
2:1	*5 wt. % aqueous solution*	94%	0-19	16.7	0-72	12.8	0-1
		88%	19-163	9	72-168	5.57	1-73
		1.5	163-513	spilling		5	73-265
		spilling				spilling	
	5 wt. % ethanolic solution	9.89	0-72	12.03	0-1	12.26	0-1
		84	72-88	89%	1-73	88%	1-217
		89	88-232	86%	73-169	dag	
		2.03	232-328				
	Solid	87%	0-168	12.03	0-1	12.26	0-1
		spilling		9.625	1-3	10.13	1-3
				11	3-19	9.625	3-19
				12.83	19-312	spilling	
				spilling			

It can be seen from the Table 2, Salt 1 shows the maximum petrocollecting property in the distilled water treated with 5 wt% ethanolic solution which is 18.02, while its maximum petrodispersing factor is seen in sea water treated with solid. Observing salt 2, it can be noted that maximum petrocollecting property is seen in tap water treated with 5 wt% aqueous solution, which is 16.7%. Maximum petrodipersing factor for the mentioned salt is inspected in sea water treated with 5 wt% aqueous solution, which is 94%.

Conclusion

Analyzing the results of surface activity measurements, petrocollecting and petrodispersing properties, it can be concluded that both salts have good surface activity and are recommended for the process of cleaning thin oil layers from the water surface.

References

1. A.Bhardwaj, S. Hartland, Applications of Surfactants in Petroleum Industry. Journal of Dispersion Science and Technology, 1993, Volume 14, - Issue 1, p.87-116

2. L.L.Schramm, E.N.Stasiuk, D.G.Marongoni, Surfactants and their applications. Annual Reports Section C, August 2003, 99, p.3-48

3. Asadov Z.H., Aga-zade A.D., Zarbaliyeva I.A.,et all. Petroleum-collecting and dispersing properties of oxypropylates of individual monocarboxylic acids (C_{16}, C_{18}) and their natural fractions // Processes of petrochemistry and oil refining, 2003, N4 (15), p. 4-16

4. Z.H. Asadov, A.H. Tantawy, A.H. Azizov, I.A. Zarbaliyeva, R.A. Rahimov. Synthesis of new complexes surfactants based on fatty acids and Study the effect of length of fatty acid chain on the petroleum and surface-active properties.Caspian Journal of Applied Sciences Research, 2013 2(3), p. 24-34

5. H.H.Humbatov, R.A.Dashdiyev, Liquidation of accidental petroleum spills using surfactants Baku: Elm,1998.200 p.(in Russian)

6. Z.H.Asadov, H.T.Nabiyeva. Synthesis and study of new surfactants based on oleic acid and diethyletriamine. Magyar Tudományos Journal, 2020 No 39, p. 14-19

7. Bogumil E. Brycki, Iwona H. Kowalczyk, Adrianna Szulc, Olga Kaczerewska andMarta Pakiet, Multifunctional Gemini Surfactants: Structure, Synthesis, Properties and Applications, 2017

8. KajolBhati, DivyaBajpaiTripathy and Anjali Gupta, Gemini ImidazoliniumSurfactants: A Versatile Class of Molecules,2020

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ASSESSMENT OF INDIVIDUAL FIRE RISK IN PUBLIC MEDICAL INSTITUTIONS WITH PERMANENT RESIDENCE OF PEOPLE (ON THE EXAMPLE OF A PSYCHONEUROLOGICAL BOARDING SCHOOL)

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Abstract. *The process of assessing individual fire risk is considered on the example of a psychoneurological boarding school as a public medical institution with a permanent stay of people. The specifics of the medical institution impose special conditions on the evacuation and rescue of people in case of fire. Conclusions are drawn about the need for additional measures to reduce the risk and supplement the legislative framework.*

Keywords: *individual fire risk, fire safety, evacuation, psychoneurological boarding school.*

Introduction

Recently, due to the development of scientific and technological progress, the use of new technologies and equipment, fires have moved to a new qualitative stage-the time of their development has been reduced, the intensity of fire has increased, the risk of exposure of combustion products to the human body and the environment has increased. Fires began to turn into local environmental disasters, bringing huge spiritual and material losses.

Every year in the Russian Federation there are more than 100 fires in hospital buildings. According to the Federal State Institution VNIIPO of the Ministry of Emergency Situations of Russia, 577 fires in psychoneurological institutions have been registered over the past five years (2015-2020).

Despite all the features of such institutions, general documents on fire safety are applicable for them: the Federal Law "On Fire Safety" (No. 69-FZ of 21.12.1994); Technical Regulations on Fire Safety Requirements (No. 123-FZ of 22.07.2008);

codes of rules 486.1311500.2020 " Fire protection systems. The list of buildings, structures, premises and equipment subject to protection by automatic fire extinguishing installations and fire alarm systems. Fire safety requirements"; GOST 12.1.004-91 System of occupational safety Standards (SSBT). Fire safety. General requirements (with Amendment No. 1) and others [1-7].

Purpose of the study – to assess the individual fire risk for people who are being treated and live in public medical institutions of special purpose (neuropsychiatric dispensaries), as well as for the personnel of such institutions.

The system of measures to ensure fire safety in healthcare institutions consists of three main groups:

1. Measures to establish a fire-fighting regime.

2. Measures to determine and maintain the proper fire-fighting condition in all buildings, structures, premises, sites, sites, offices, individual places and points.

3. Measures for the control and supervision of the implementation of fire safety rules during the operation, repair, maintenance of buildings, structures, premises, utility networks, equipment, inventory, etc.

Ensuring fire safety in healthcare institutions can be achieved by implementing all of the above measures. These activities should cover all functional units. These activities should be organized and carried out, first of all, by officials of the institution who, by virtue of their official duties, own, use, operate buildings, structures, premises, plots, offices, equipment, property, inventory, etc., have subordinate personnel who must comply with the requirements of the technical regulations on fire safety. The head of the institution, when distinguishing the responsibilities of subordinate officials, must make sure that each of them fulfills the requirements of fire safety and, in turn, ensures their compliance by subordinate employees in certain areas of work.

To prevent the dangerous effects of fire, to ensure the organized movement of people during evacuation, the removal of material values in buildings, premises, on the floors of buildings, evacuation routes and exits are provided. For each floor and the building as a whole, evacuation plans are made for people and material values. The number of evacuation exits from buildings, premises and from each floor is taken by calculation, but usually there should be at least two of them.

An evacuation plan is being developed, which consists of: graphic and text parts. The evacuation plan is accompanied by a log of working out the evacuation plan (at least 1 time a year, the names and time of working out are entered in the log).

In addition to evacuation plans for the institution as a whole, each room, ward, etc. should be provided with an individual evacuation plan with a reminder of fire safety measures and rules of conduct in fire conditions.

The evacuation plan should show: stairwells, elevators and elevator halls,

rooms (rooms) with the designation of doorways, balconies, corridors, external stairs.

In addition to evacuation plans, safety signs are placed in the building of the institution (designation and indication of the locations of fire protection equipment and their elements; designation of the direction of movement during evacuation, as well as prohibiting, warning, prescriptive and other signs).

Materials and methods

In accordance with the methodology for determining the calculated values of fire risk in buildings, structures and structures of various classes of functional fire hazard, the individual fire risk $Q_в^н$ meets the requirement [3]:

$$Q_в \le Q_в^н, \quad (1)$$

when $Q_в$ – estimated value of individual fire risk, year $^{-1}$; $Q_в^н$ – the normative value of individual fire risk, $Q_в^н = 10^{-6}$ year $^{-1}$.

The calculated value of the individual fire risk for the i-th fire scenario in buildings of the functional fire hazard class F1.1, F1.3, F1.4 is calculated by the formula (2):

$$Q_в = Q_п \cdot (1- (P_э +(1 - P_э) \cdot P_{сп}). \quad (2)$$

The probability of evacuation ($Pэ$) from buildings of the functional fire hazard class F1.1, F1.3, F1.4 is calculated by the formula (3):

$$Pэ = (N_{эв} – N_{н.эв})/ N_{эв}. \quad (3)$$

Results and discussion

Medical institutions are mainly built according to standard projects, the fire resistance of such buildings is in most cases I and II degrees. The development of the fire will occur mainly on the combustible materials. Doors, wooden floors and attic structures are mainly exposed to fire. Since almost all medical institutions have supply and exhaust ventilation, one of the main problems in this situation is the rapid spread of smoke, which makes it difficult to evacuate patients. The main danger is combustion product in X-ray rooms, the release of hydrogen cyanide is possible, in phar-macies and pharmaceutical departments, the release of carbon monoxide and other toxic substances is possible. The presence of flammable substances and objects in pharmacies and laboratories also contributes to the rapid spread of fire. In addition, there are some features in institutions of this type, for example, these are blind bars on the windows and the presence of people who cannot move independently, as well as the possibility of panic. Which is one of the main causes of death of people in fires.

To calculate the individual fire risk, a typical project of a building with dimensions of 68.7×28.8 m, a height of 5.6 m of the II degree of fire resistance was chosen. The walls and parti-tions are brick, the attic floor is reinforced concrete, the

roof is asbestos-cement sheet (slate) ac-cording to the wooden crate, there is an attic room, central heating, electric lighting 220 volts. In the external walls there are window openings with dimensions of 2.1×1.7 m, door openings with di-mensions of 2×1.2 m, in the corridors 2×1.5 m. The building has 1 main and 2 emergency exits. The building can accommodate up to 70 people at the same time. We accept that the fire resistance of the structure, the internal layout, evacuation routes and fire protection systems meet the require-ments.

To predict fire hazards, integral (forecast of the average values of the parameters of the en-vironment in the room for any moment of fire development), zone (forecast of the sizes of charac-teristic spatial zones that occur during a fire in the room and the average values of the parameters of the environment in these zones for any moment of fire development) and field (differential, based on the solution of partial differential equations expressing the fundamental conservation laws at each point of the computational domain) calculation methods are currently used.

In our case, we use a zonal (zone) model. The zone model assumes the allocation of several zones in the room: a smoke layer, a non-smoky layer, a convective column - in which the ther-modynamic parameters can be considered homogeneous.

The following assumptions are taken into account in the calculation:

a) the fire is regulated by the load, i.e. the decrease in the amount of oxygen in the fire room is not taken into account;

b) the fire starts at the center of the load and spreads radially at a constant speed.

Suppose that a fire occurs in the physiotherapy room, the initial data for the calculation are presented in Table 1. The results of the calculations of the blocking time for two points are present-ed in Table 2.

Table 1.

Parameter	Unit of measurement	Meaning
Fire area	m^2	1
Typical fuel load	Industrial goods, textiles	
Q - lower heat of combustion	MJ/kg	13,8
v_F - specific mass burnout rate	kg/ (m^2·s)	0,0145
v - linear flame propagation velocity	m/s	0,0045
L_{O_2} - specific oxygen consumption	kg/kg	1,03
D_m - the smoke-forming ability of the burning material	Np·m^2/kg	270
Maximum output CO_2	kg/kg	0,203

Maximum output CO	kg/kg	0,0022
Maximum output HCl	kg/kg	0,014
Fire criteria	Time	
Simulation time	s	400
Initial temperature	°C	20
Number of people in the building	person	70

Table 2.

Design point	Blocking time	By increased temperature	By loss of visibility	O_2	CO_2	CO	HCl	By heat flow
No. 01	6,66	6,66	6,66	6,66	6,66	6,66	6,66	6,66
No. 02	0,80	3,28	0,80	4,32	6,66	6,66	1,59	1,59

The estimated time of blocking for the premises of the main stay of people is not dangerous. The blocking time for the calculated point (the location of the fire source) is 48 seconds (0.8 minutes).

The estimated time of evacuation of people t_p from premises and buildings is established by calculating the time of movement of one or more human flows through evacuation passages from the most remote places of accommodation of people. When calculating the entire path of the human flow is divided into sections (passage, corridor, doorway, staircase, vestibule) of length l_i and width δ_i. The initial sections are passages between workplaces, equipment, rows of chairs, etc. When determining the estimated time of evacuation of people, the length and width of each section of the evacuation route for projected buildings are taken according to the project, and for constructed buildings – according to the actual position. The length of the path along the staircases, as well as along the ramps, is measured by the length of the march. The length of the path in the doorway is assumed to be zero. An opening located in a wall with a thickness of more than 0.7 m, as well as a vestibule, should be considered independent sections of the horizontal path having a finite length l_i.

Simulation examples for 4 sites out of 101 are shown in Table 3, floor No.1. The total estimated evacuation time for scenario 1 is 4.893 minutes (or 4 minutes 53 seconds). The accumulation time does not exceed 6 minutes.

Table 3.

No. section	Tipe of section	Length, m	Width, m	Number of people	Average horizontal projection people, m^2	Mobility group	Flow density	Evacuation time, min.
1-30	Horizontal path	6,64	3,2	1	0,1	No mobility restrictions	0,005	0,066
30-31	Doorway	0	1,2	-	-	-	-	0,066
13-62	Horizontal path	7,016	4,8	3	0,2	Low mobility group M2	0,018	0,234
62-63	Doorway	0	1,2	-	-	-	-	0,234

The results of determining the calculated values of individual fire risk are summarized in Table 4.

Table 4.

Name of the parameter	Parameter value
$Q_{п,i}$ - the frequency of a fire in a building during the year	$1{,}30 \cdot 10^{-2}$
$P_{пр,i}$ – the probability of the presence of people in the building	0,0
$P_{э,i}$ – the probability of evacuation of people	0,599
The estimated point at which the worst-case scenario of a fire is observed	1
$t_{бл}$ – the time from the start of the fire to the blocking of evacuation routes as a result of the spread of fire hazards on them at the calculated point, min.	6,667
$t_{н}$ – required evacuation time at the calculated point, min.	5,333
$t_{н.э.}$ – evacuation start time at the calculated point, min.	4,0
$t_{р}$ – estimated time of evacuation of people at the calculated point, min.	4,893
$t_{ск}$ – the time of clusters, min.	0,298
$K_{П.З.,i}$ – the coefficient that takes into account the compliance of fire protection systems with the requirements of regulatory documents on fire safety	0,8704

Name of the parameter	Parameter value
$K_{ПДЗ,i}$ – the coefficient that takes into account the compliance of the smoke protection system with the requirements of regulatory documents on fire safety	0,8
$K_{СОУЭ,i}$ – the coefficient that takes into account the compliance of the system for notifying people about a fire and managing the evacuation of people with the requirements of regulatory documents on fire safety	0,8
$K_{обн,i}$ – the coefficient that takes into account the compliance of the fire alarm system with the requirements of regulatory documents on fire safety	0,8
$K_{ап,i}$ – the coefficient that takes into account the compliance of automatic fire extinguishing installations with the requirements of regulatory documents on fire safety	0,9
$Q_{B,i}$ – the value of the individual fire risk	$1{,}69 \cdot 10^{-6}$

Conclusion

1. The individual fire risk exceeds the permissible value and is $1{,}69 \cdot 10^{-6}$ year^{-1}, what requires special attention and study.

2. Despite the fact that the fire resistance of the structure, the internal layout, evacuation routes and fire protection systems in the model building of the psycho-neurological dispensary meet the requirements of fire safety, people will not have time to evacuate from the building and be exposed to dangerous fire factors. This is due to the fact that the majority of people inside are unhealthy (the M2 mobility group), some of them cannot move independently due to physical or mental abnormalities.

3. In the event of a fire, the main burden and responsibilities for evacuation fall on the service personnel, who must be prepared for actions in emergency situations, fire.

4. We believe that today insufficient attention is paid to the issues of fire safety in such institutions and additional measures (organizational and technical) are needed to improve safety in emergency situations. As well as additional regulatory legal acts containing requirements for such medical institutions.

References

1. Federal Law of the Russian Federation No. 69-FZ of 21.12.1994 "On fire safety".

2. Federal Law of the Russian Federation No. 123-FZ of 22.07.2008 "Technical regulations on fire safety requirements".

3. Methodology for determining the calculated values of fire risk in buildings, structures and structures of various classes of functional fire hazard, approved by the order of the Ministry of Emergency Situations of Russia of 30.06.2009 No. 382.

4. SP 1.13130.2020. Fire protection systems. Evacuation routes and exits, approved by the order of the Ministry of Emergency Situations of Russia of 19.03.2020 No. 194.

5. SP 2.13130.2020. Fire protection systems. Ensuring the fire resistance of protection objects, approved by the order of the Ministry of Emergency Situations of Russia of 12.03.2020 No. 151.

6. SP 3.13130.2009.. Fire protection systems. The system of notification and management of evacuation of people in case of fire. Fire safety requirements, approved by the order of the Ministry of Emergency Situations of Russia of 25.03.2009 No. 173.

7. SP 4.13130.2013. Fire protection systems. Limiting the spread of fire at protection facilities. Requirements for space-planning and structural solutions (with Amendment No. 1), approved by order of the Ministry of Emergency Situations of Russia of 24.04.2013 No. 288.

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APPLICATION OF INNOVATIVE AGRO-FIRE TECHNOLOGIES IN AGRICULTURE AND FORESTRY

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Abstract. *The article presents the results of a system analysis of the use of unmanned aerial vehicles (UAVs), incl. for agricultural technologies, as well as airplanes and helicopters for extinguishing fires. On the basis of the obtained analysis results, a system synthesis of a hybrid aircraft was carried out to integrate the solution of these problems, which is an airship.*

It is shown that airships are mobile, reliable and autonomous means, with high carrying capacity and weight efficiency, versatility and low total cost: 10 times less than the manufacture of a helicopter and 100 times less than its operating costs. At the same time, unlike UAVs, airships allow the use of nanotechnology (membrane, thermomagnetic) separation of atmospheric gases, as an "endless source of fire extinguishing composition" to suppress fires and landscape fires, and also solve all the problems of UAVs, including innovations in agricultural technologies.

Keywords: *Unmanned aerial vehicles (UAVs), helicopters, airplanes, airships, membrane and thermomagnetic nanotechnologies, agricultural technologies, integration of safety technologies and agricultural technologies.*

Unmanned aerial vehicles (UAVs) are beginning to be used in various fields of human activity, and obviously the time has come for their use in the largest industry - agriculture.

Already in 2016, about 48% of commercial UAVs were used in the field of agriculture, and according to foreign forecasts, by 2026 this figure will grow to 80%. For example, in Pittsburgh (USA), Skycision actively uses UAVs and infrared technologies, both in the diagnosis of diseases and for monitoring pests of agricultural crops. The UAV operator takes hundreds and thousands of infrared images and then creates a detailed map with photographs. Moreover, infrared sensors are

even able to determine the amount of chlorophyll in plants, and this is a marker of diseases - if chlorophyll is reduced, then the crops are affected. In this case, you can use the "Doctor of plant medicine" program, which will diagnose the problem and give a recommendation for the processing of agricultural crops [1].

Figure 1. *Helicopter UAV*

An alternative solution was the use of motor hang-gliders, equipped with special equipment, which made it possible to get rid of the problems of "big aviation" and to reach a new level of quality of farmland processing. So, for example, the agrochemical complex (ACC) "Agropatrul-04" (fig. 3), developed by specialists of LLC "AVIASPEKTR", has been operating in the Samara region since the end of the last century and has established itself as a reliable and economical ACC, which can work with any soil roads and restricted areas. Installed chemical equipment allows you to add drugs with maximum accuracy [3].

Figure 3. *Agro-moto hang-glider*

Currently, monitoring of farmland, as well as forests and steppe areas is carried out using helicopters, airplanes, satellites, and even a simple bypass of fields with measuring instruments, which takes a lot of time and resources. Thanks to the UAV, this can be done much faster and cheaper. Equipping UAVs, for example, with ultrasonic "scarers" can protect fields from birds and rodents, and spraying the appropriate chemicals from other crop pests. The use of infrared cameras and other innovations simplifies and accelerates the transition to precision farming [1,2].

In Russia, for eight years now, on the basis of MEPhI, they are engaged in UAVs of various applications on a single platform that allows monitoring the environment, video filming and cargo transportation. However, each complex was manufactured individually, and such a system was poorly scalable, and in order to produce data that the farmer could understand, a lot of work was required, which was beyond the power of one company. Therefore, AgroDronGroup is a group in which there are two laboratories at Moscow State University, the Research Institute of Agrochemistry of Pryanishnikov, the Research Institute of Potato Growing Lorkh, the Research Institute of Biological Plant Protection and even the Korean University of Konkuk, i.e. a group of specialists in the agricultural sector and UAV specialists. With the help of such a combination, field experiments are carried out, which lead to the formation of algorithms for the formation of databases, with the use of which we obtain data that the farmer understands. At the same time, the cost of supplying a UAV depends on several parameters: the volume of areas and the volume of analytics, since for one type of analytics, it is necessary to make one overflight, and for another type, five overflies, including the factor of the distance of the farm from the bases with the UAV [2].

UAV monitoring of farmland and forest areas can solve the problem of early detection of fires, the main causes of which are the type of dominant vegetation, climatic conditions and the "human factor" [4, 5].

The fact is that the real scale of forest fires in Russia and the amount of damage caused by fire have not been reliably established until now, since **regular monitoring of forest fires is carried out only in the zone of active protection of forests, due to the limited material and human resources** [5,6].

Many countries, such as the USA, Canada, Australia, France, for which the problem of forest fires is urgent, have special aviation fire brigades, and Russia is no exception, because firefighting equipment based on aircraft in Russia has been used for almost 90 years: test flights to monitor the fire situation have been carried out on two-seat biplane U-2 (PO-2) since 1931 [7].

For example, AN - 32P with a full refueling of two tanks with a total capacity of 8 tons at a speed of 240-260 km/h, spraying the composition at a height of 40-50 m, allows you to create a protective strip up to 160 m long and up to 35 m wide. ef-

fectively extinguishing a fire using the BE-200 aircraft, which in the planing mode fills its 6-ton containers with water in 14-16 seconds, including on a wave height of up to 0.8 meters. The aircraft is very economical - for one refueling, it is able to collect and bring down 320 tons of water to the fire. However, the disadvantage of these methods and devices is a very significant complexity of aerobatics, as well as the fact that there are not always reservoirs near fire centers that allow water intake in the planing mode [7, 8].

Unlike airplanes, helicopters MI-8, Ka-32 and MI-26 with spillways, the transport speed of a container with water is much lower and in case of fires in small areas or in mountainous areas, this is a fundamental advantage, since during spills at high speeds, at heights exceeding 40–50 m from the earth's surface, the discharged liquid as a result of the oncoming air flow breaks down to the state of aerosols and most of it evaporates without reaching the fire source [8].

A common disadvantage of these methods and devices is the high cost of both the equipment itself and its operation, as well as low efficiency, since airplanes and helicopters constantly have to refuel with water, fly up to the place of fire, pour out water and fly away to refueling, during which the fire flares up with renewed vigor [8,9].

Recently, both in Russia [10, 11] and abroad, a new class of hybrid aircraft has appeared, combining the principles of an airship, an airplane and a helicopter: in Russia - "BARS" and "DELTOSKAN", in the USA - R-791, in England - Skyship. In China, the French company Flying Whales, together with the Chinese state aircraft company General Aircraft Co., Ltd, are building a plant for LCA60T rigid airships with a carrying capacity of 60 tons, filled with helium, the serial production of which is scheduled for 2021 [12].

Thus, **airships are mobile,** reliable and **autonomous** means, with **a high carrying capacity** and weight efficiency, versatility of application, up to the solution of manned astronautics problems [13] and a **low total cost,** including the cost of **manufacturing - 10 times lower than helicopters, and operating costs - 100 times lower.** However, all of these aircraft (airplanes, helicopters, airships) use water to extinguish fires, which, as a rule, is absent in the steppe and forest areas [7-13].

A systematic analysis of the above agrotechnical problems and tasks of protecting farmland, steppe and forest areas leads to the conclusion that it is possible and necessary to integrate them using airships (fig. 4), including in unmanned modes, using nanotechnology (membrane, thermomagnetic) separation atmospheric gases, as an "endless source of fire extinguishing composition" [14], to suppress fires in mountainous areas, forest and landscape fires, as well as for the above innovations with UAVs and in agricultural technologies [15,16].

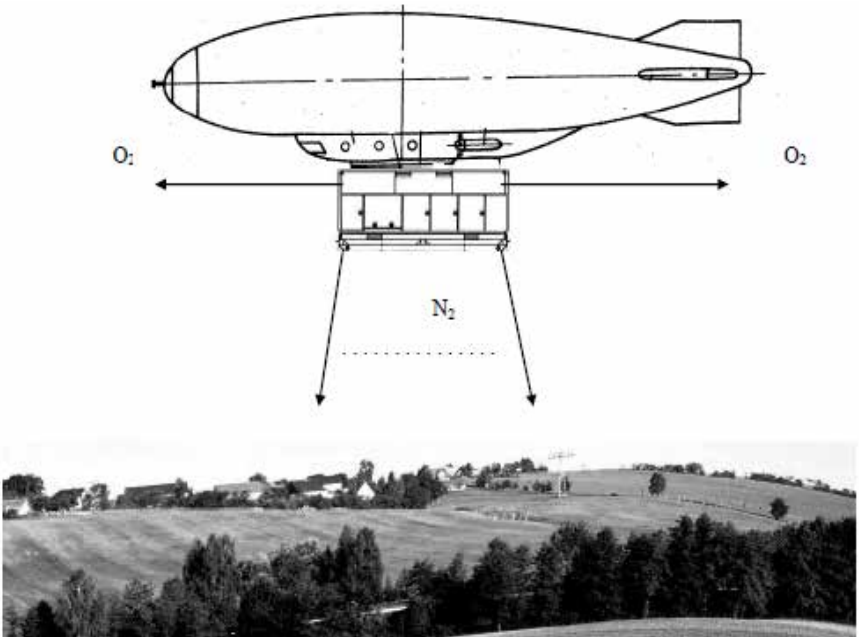

Figure 4. *Schematic of the model with NMU*

Unlike the configuration of the airship according to the claimed method of detecting and extinguishing farmland, steppe and forest fires with atmospheric nitrogen [17], a nitrogen membrane unit (NMU) container can be the "1st floor" of a rigid suspension complex, which, due to its weight and size characteristics (dimensions - 6.0×2.5×3.6m, weight - 11500 kg) may well replace the necessary "mooring devices", and on the "2nd floor" the cockpit and other necessary compartments can be mounted (fig.4), for the implementation of technological and auxiliary functions.

The results of the system synthesis of models for the integration of agrotechnical and fire-fighting tasks have shown their high efficiency [4,14-17]:

firstly, due to the possibility of equipping airships with any equipment for diagnosing the environment and underlying surface, which cannot be installed on a UAV, and is difficult to adapt to onboard versions for helicopters and airplanes,

secondly, due to the possibility of convenient (without parachute) "landing" of agricultural specialists and/or firefighters-rescuers with the necessary technical means anywhere on the airship patrol route, which is impossible not only for UAVs, but also for aircraft, as well as for all helicopters, except for MI-26,

thirdly, because of the economy of movement and the simplicity of "hovering and landing" of the airship as needed when patrolling along the route, including watering, spraying fertilizers and protection chemicals,

fourthly, in the absence of duplication and the possibility of economically creating and maintaining in real time a unified database of farmland, steppe and forest areas,

fifthly, in the possibility of round-the-clock patrolling and response to emergencies along the optimal routes of the territories of all regions of Russia, including hard-to-reach and mountainous areas, which is impossible neither by existing means, nor by UAVs, nor by individual services (Ministry of Emergency Situations, Rosles, Agroprom) due to the limited material and human resources,

sixth, they do not require the construction of special "berthing facilities",

seventh, in the emergence of such a synergistic system that ensures both fire and food security.

If, to perform agrotechnical or rescue tasks, it is necessary to transport water for irrigation or solutions for spraying, fertilizers or equipment, then the obvious solution is to dock the NMU container with a similar container for these purposes (fig. 5), without increasing operating costs (within the carrying capacity of the airship).

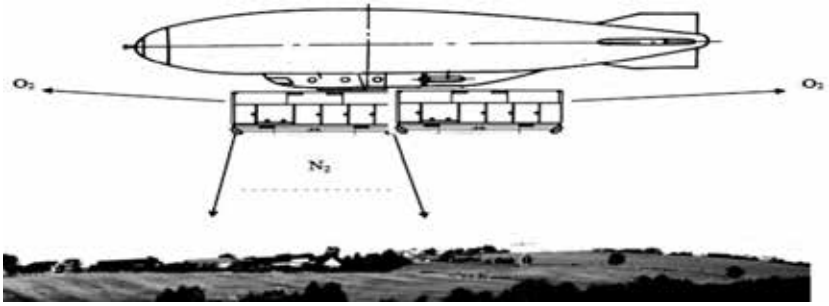

Figure 5. *Schematic of a model with NMU and an additional container for equipment and/or passengers*

Thus, in terms of carrying capacity and spaciousness, the airship surpasses all today's means of aviation forest protection and means leased by the agro-industrial complex, in connection with which, it can be argued that the combination of solving the problems of ensuring security and agricultural technology will reduce the unit costs for each of them by at least two orders of magnitude. them, because the airship, due to the aerostatic scheme, has constant costs for its movement, which does not depend on the load (within the limits of its carrying capacity),

since according to the calculations of the specialists of the Russian Aeronautical Society, the flight hour of the airship costs about 4 thousand rubles, i.e. **almost 3 orders of magnitude cheaper than a helicopter** (on average 40 thousand rubles). Moreover, if the average density of the cargo is less than 0.4 t/cu. m, then their transportation by airships is more economical than by airplanes, and at a density of less than 0.2 t/cu. m - more economical than any ground means of transport [18].

In addition, the proposed integration of the tasks performed by the airship's crew and its technological capabilities make it possible to protect against the spread of fires in the steppes and forests by installing "electrical protection strips" instead of mineralized, because with the help of the airship it is possible not only to "carry them with you" for an infinitely long time, but also use them, since the power plant of the airship can provide the required high-voltage voltage for this. Domestic studies of the influence of electric and acoustic fields on the processes of combustion and extinguishing fires, carried out at the end of the last century [19-21], have shown their high efficiency. In particular, it was found that high-voltage pulsed electric fields emitted by a metal mesh (fig. 6) block the spread of fire much more efficiently than mineralized stripes, and also do not require special equipment to create an embankment [21].

Figure 6. *Radiated metal mesh*

References

1. Ukhanov R.V. Drones in agriculture. Overview of global trends [Electronic resource] – URL: https://vc.ru/transport/72705-drony-v-selskom-hozyaystve-obzor-mirovyh-tendenciy (appeal date - 07.07.2020).

2. Rubin D.T. Ideal drone for agricultural needs [Electronic resource] URL: https://russiandrone.ru/experts_opinion/dmitriy-rubin-intervyu/ (appeal date 06.07.2020).

3. Aviation agrochemical complex "AgroPatrul-04" – URL: http://www. aviaspektr.ru/aviachim.htm (appeal date - 07.07.2020).

4. Topolsky N.G., Belozerov V.V., Afanasyev N.S. Fire protection of Russian forests // Technosphere safety technologies. - 2010. - № 4(32). – 6 P. URL: http:// academygps.ucoz.ru/ttb/2010-4/2010-4.html (appeal date - 07.07.2020).

5. Sobolev S.A., Denisov A.N., Kolchin E.A. Influence of the pyrogenic factor on natural ecosystems // Research in earth sciences: retrospective, current trends and prospects for implementation: coll. of works of Internat. sci.-pract. conf. Astrakhan: ASU publishing house, 2019, P. 63-69.

6. Tsvetkov P. A., Buryak L. V. Study of the nature of fires in the forests of Siberia // Siberian Forest Journal.- 2014.- № 3.- P. 25–42.

7. Improvement of fire engines based on aircraft / V. P. Perminov [et al.] // Fire protection in the service of the state: 1918-2018: coll. sci. art. – Ufa: USATU, 2018. P. 92-130.

8. Grigorievskaya A.O., Ivanov N.V., Vishnev A.V. Analysis of the use of aviation for extinguishing forest fires // Reshetnevskie readings: collection of articles. materials XVIII Intern. scientific. conf., dedicated. To the 90th anniversary of the birth of Acad. M.F. Reshetneva / part 1 – Krasnoyarsk: SibGAU, 2014, P. 351-352.

9. Kurakov F.A.Technologies for extinguishing landscape fires as a possible scientific and technological priority of the Russian Federation // Economics of Science. – 2017. - V.3. - № 3. - P. 214-226; DOI 10.22394/2410-132X-2017-3-3-214-226.

10. Bikkuzhin F.F., Bikkuzhina E.F. Fire airship // /RF patent № 2250122, publ. 20.04.2005, Bull. № 11.

11. Nikulin. S.E., Popov N.L., Shanin A.P. Airship firefighter diving //RF patent № 2573489, publ. 20.01.2016, Bull. № 2.

12. Brief overview of hybrid aircraft projects [Electronic resource] – URL: https://lenta.ru/articles/2013/11/16/ustol/ (appeal date 06.07.2020).

13. Kulikov I.N. Directions of using airships for solving the problems of manned astronautics // Manned space flights. - 2019.- № 4 (33).- P.92-105.

14. Belozerov V.V., Dolakov T.B. On a synergistic approach to solving problems of water and food security // State and prospects for the development of the agro-industrial complex: coll. sci. works XII Internat. sci.-pract. conf. Within the framework of the XXII Agroindustrial Forum "Interagromash" - 2019. - Rostov on Don: DSTU (ANC "Donskoy"), 2019.- P. 572-577.

15. Valery Belozerov, Mihail Nikulin and Nikolay Topolsky Nanotechnology for the suppression of fires in agricultural land and forests /XIII International Scientific and Practical Conference "State and Prospects for the Development of Agribusiness – INTERAGROMASH 2020" //E3S Web Conf., 175 (2020) 12007; DOI: https://doi.org/10.1051/e3sconf/202017512007

16. Shilina A.N., Erofeev S.Z., Denisov A.N., Danilov M.M. Factors influencing the performance of a tactical task in a mountainous and wooded area // Civil defense on guard of peace and security: mat. of III Internat. sci.-pract. conf. dedicated to World Civil Defense Day / in 3 parts – M.: ASPS EMERCOM RF, 2019, P. 467-473.

17. Belozerov V.V., Voroshilov I.V., Denisov A.N., Zubkov S.G., Nikulin M.A., Topolsky N.G., Belozerov Vl. V. Method of detecting and extinguishing fires of farmland, steppe and forest areas with atmospheric nitrogen // Patent for invention 2751365 S1, 13.07.2021. Application № 2020137914 dated 19.11.2020.

18.Popadeikin V.V. Multipurpose unmanned airship as an innovation in the national economy [Electronic resource] – URL: https://russiandrone.ru/ publications/mnogotselevoy-bespilotnyy-dirizhabl-kak-innovatsiya-v-narodnom-khozyaystve/ (appeal date 06.07.2020).

19. Method of preventing spontaneous combustion of combustible steam-gas-air mixtures / Sergey Vereshchagin [et al.] - A.S. 1282849 publ. 15.01.87, bull. № 2.

20. Flame extinguishing method / Anatoly Pulin [et al.] - A.S.1683782 publ. 15.10.91, Bull. № 38

21. Dudyshev V.D., New technology for extinguishing and preventing fires // Ecology and Industry of Russia. - 2003.- 12.- P.30-32.

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CLASTOCARST OF THE SOUTHERN CIS-URALS

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Abstract. *It has been established that along with the traditional types of sulfate and carbonate karst, its specific type, clastocarst, is developed in the Southern Cis-Urals. Its general characteristics are given, the regions and the intensity of distribution of clastocarst forms are determined. The main regularities of their distribution are established and the current activity of the development of clastocarst in the region is estimated.*

Keywords: *Southern Cis-Urals, Republic of Bashkortostan, Perm Krai, clastocarst, karst fields, karst sinkholes.*

Introduction

The southern Cis-Urals is characterized by the wide development of karst with the distribution of the most diverse forms of its manifestations, both surface and underground [9]. Along with the traditional types of karst in terms of the composition of karst rocks (salt, sulphate and carbonate), a specific type of karst is developed in the region, associated with the dissolution of inclusions of soluble components contained in rocks.

The term clastocarst was introduced into the scientific literature by G.A. Maksimovich to denote the phenomenon of chemical and mechanical impact (dissolution and suffusion) of groundwater on sedimentary rocks (clays, loams, loesses, sandstones, conglomerates with soluble cement) [5, 14]. Today this term has become firmly established in Russian karst studies and is used by many geologists to designate processes similar to karst in conglomerates, sandstones, breccias. The author, following G.A. Maksimovich, under klasokarst understands the dissolution and leaching of readily soluble inclusions (sulfates and carbonates) in sedimentary clays and silicate rocks.

Despite the presence of the long-known clastocarst in the region, its special studies have not been carried out until now, the available single publications on it are limited only to information on the forms of its manifestations in individual

parts of the southern Urals. Moreover, despite the mention of him in the published [2, 3, 6, 7, 13, etc.] and numerous stock (Shevchenko, Sapozhnikov, 1969, Belyaev, Eremina, 1971, Eremina, Tabakov, 1972, Murtazin, Chaiko, 1973, Feschenko, Feshchenko, 1976, etc.) literature, as an independent type of karst, clastocarst received a cartographic display only in 2005 in the Atlas of the Republic of Bashkortostan [10]. It contains a small-scale karst map, which reflects the areas of clastocarst distribution in the territory of the Republic of Bashkortostan (RB) and the extent to which it is affected by surface manifestations.

The purpose of the study is to analyze the development of clastocarst as a whole in the region under consideration, to establish patterns of distribution and to determine the current activity of its manifestation on the surface.

Initial data and research methods

The initial materials for the research were the data contained in the production reports of OJSC "Bashkirgeologia" of the author on the study of exogenous geological processes (EGP) and his own research in 2018-2020. [12, 13].

The research results are based on the materials for decoding large-scale (1-17 000-25 000 1957-1960 flights) aerial photographs, updated with modern satellite images using SASplanet and verified by field routes 2018-2021. (A. Smirnov and Yu Sokolov).

Results and discussion

The distribution of clastocarst on the modern map of the types of karst of the Southern Urals and the Cis-Urals [12] is shown in figure 1, from which it follows that clastocarst is developed exclusively in the karst country of the East European Plain and is relatively scarce in comparison with other types of karst in terms of the composition of karst rocks. Its largest continuous areas are typical for the northeast of the region (I-B) on the Priay plain. In the west (I-A), it is developed locally in some parts of the Belskaya plain, and in the rest of the territory, clastocarst is not found.

On the Priay plain, clastocarst is distributed in its western gently undulating part to the east of the Ufa plateau with a carbonate type of karst (along the Duvan-Krasnoufimsk meridian). It is developed here in terrigenous deposits of the Koshelevskaya suite (Irensky horizon) of the Kungurian stage of the lower section of the Permian system.

The Koshelevskaya Formation, 50 m thick in the south to 250 m in the north, is composed of carbonated and gypsum sandstones, siltstones and mudstones. Gypsum-bearing (with nests, lenses, and gypsum interlayers) polymictic, well-permeable sandstones occupy almost 50% of the total section of the formation.

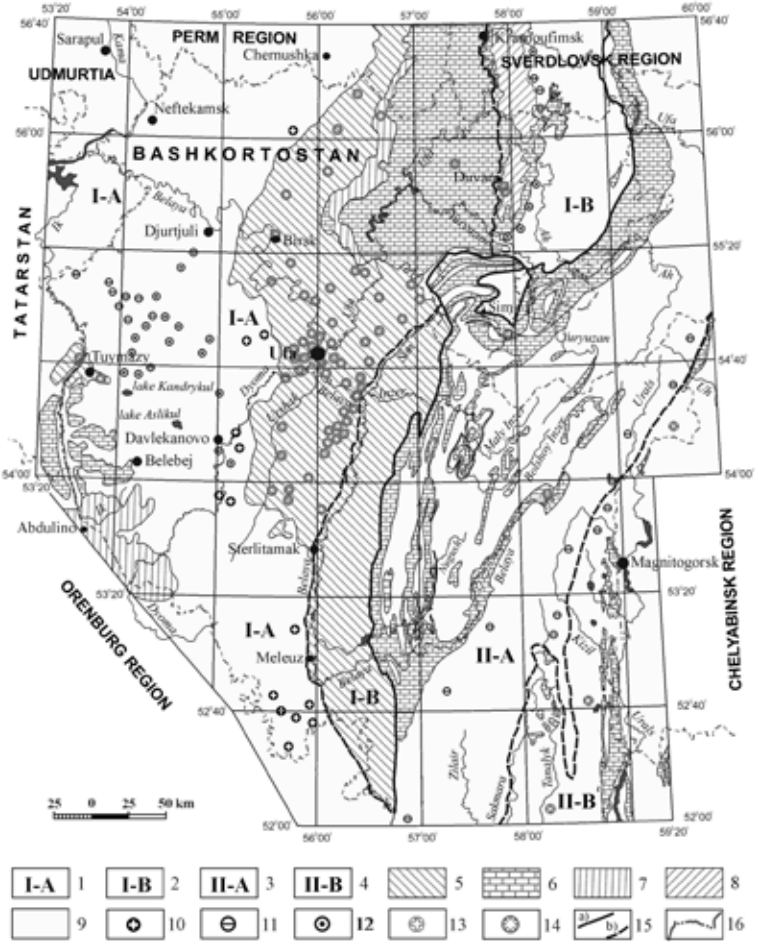

Figure 1. *Types of karst of the Southern Urals and Cis-Urals (Smirnov, 2020 [12 on 6, 7])*

Karst country of the East European Plain (I): 1 — (I-A) plain kart in horizontally and gently lying rocks of the Cis-Urals; 2 — (I-B) plain and foothill kart of the Cis-Urals in gently sloping and weakly dislocated rocks.

Ural karst country (II): 3 — (II-A) mountain and foothill karst in dislocated and highly dislocated formations of the Urals; 4 — (II-B) flat karst in folded-block sediments of the Trans-Urals. Karst types: 5 — sulfate, 6 — carbonate, 7 — sulfate-carbonate, 8 — clastocard, 9 — areas with no surface manifestations of karst. Local manifestations of karst: 10 — sulfate, 11 — carbonate, 12 — clastocard, 13 — sulfide. 14 — large karst sinkholes with a fixed formation time. Borders: 15 a) — karst countries, b) — types of karst by the nature of the relief and the conditions of bedding of rocks, 16 — subjects of the Russian Federation

The maximum distribution of surface karst manifestations in the area of the Koshelevskaya suite was recorded by us on the western edge of the Priay plain at the foot of the eastern slope of the Ufa plateau, 2-4 km southeast of the village Duvan (between the village of Ulkundy and the village of Pichugino). They are represented mainly by bowl-shaped and cone-shaped funnels, less often by sinkholes. Their diameter is usually 5-30, less often 50 m, and their depth ranges from 2-5 to 15 m. Often there are funnels merged (with adjacent sides) and an accumulation of funnels, forming karst fields (fig. 2), on which the density of funnels reaches 100 pieces per 1 km^2 [13].

Figure 2. *Field of clastocarst funnels on the southern outskirts of c. Ulkundy*
(Duvan district of the Republic of Bashkortostan)
Photo by Y. Sokolov, September 2021

To the north and south of the village of Duvan, the occurrence of sinkholes decreases, following a decrease in the gypsum content of sandstones. Meanwhile, in the extreme north and south, in the area of development of the Koshelevskaya Formation, there are karst fields similar to the Ulkindinsky, associated with lenses and interlayers of gypsum. So, 10 km south-southeast of Krasnoufimsk, the density of craters with a diameter of 5-70 m and a depth of up to 15 m is 40-50 pieces per 1 km^2 [13. 30 km south of the village of Duvan (in the Yuryuzan-Atavsky interfluve), the density of craters is higher and amounts to 50-100 pieces per 1 km^2. Funnels here are mostly round, 5-50 m in diameter, 3-10 m deep, bowl-shaped and conical (fig. 3). Part of the funnels with ponors and plaster outcrops.

Figure 3*. Clastocarst funnels in the Yuryuzan-Atavsky interfluve*
(Salavat region of the Republic of Bashkortostan)
Photo by Y. Sokolov, September 2021

Outside the distribution of the Koshelevskaya Formation, clastocarst on the Priay Plain is developed along the left bank of the Ai River and is associated with the gypsum sandstones of the Sabanakovskaya Formation of the Kungurian Stage of the Lower Permian The gypsum content of the Formation is extremely uneven; therefore, surface manifestations of clastocarst are formed only in some local areas. Funnels on them are small in size (up to 25 m in diameter) and usually occur singly. Karst fields are rare, but the density of craters on them per 1 km^2 can reach 110 pieces.

On the Pribelskaya Plain, clastocarst is distributed locally in small areas in its western part, with their greatest occurrence in a strip about 70 km wide between the cities of Tuimazy and Dyurtyuli. V.I. Martin, according to engineering-geological surveys, notes its development also in certain areas in Ufa [7]. R.F. Abdrakhmanov et al. In the article of the Geological Bulletin of the Institute of Geology № 1 for 2021 give a map of the distribution of karst in the territory of the Southern Urals and the Cis-Urals [1, p. 107], which without explanations and justifications display the areal distribution of clastocarst along the left bank of the Dema and Belaya rivers at the latitudes of cities Davlekanovo-Dyurtyuli along the meridian of Belebey, and on the Priay plain, instead of clastocarst, a sulphate-carbonate type of karst is mapped. The authors of the article indicate a link to the map from the monograph "Karst of Bashkortostan" 2002 [2], but in the form as it is presented in the article, the map is absent in the monograph, and the overwhelming part of the contours of the main types of karst on it is identical to the map of karst types of the Southern Urals and the Urals 2020 [12, p. 44]. The monograph also contains a map of the karst of Bashkortostan by V.I. Martin without the contours of the areal distribution of clastocarst [7, p. 164].

Clastocarst on the Pribelskaya Plain is associated with sandy-clayey deposits of the Sheshminskiy horizon of the Ufa stage of the lower calving of the Permian system. Calcium sulphate and carbonate, together with clay cementitious material, is present in the rocks of the horizon in the form of cement. According to the state geological survey at a scale of 1:200,000, the amount of calcium sulfate in the cement of terrigenous rocks does not exceed 10%, and calcium carbonate reaches 40%. In addition, they contain thin (no more than 3 m) gypsum interlayers and lenses that are not sustained along strike.

V.I. Martin notes the development of clastocarst also in the rocks of the Lower Kazan substage of the upper section of the Permian system [7], but the author's studies of clastocarst did not record relief forms within the boundaries of development from the surface of this stratigraphic unit when decoding large-scale aerial photographs and during field routes.

Surface manifestations of clastocarst on the Belskaya Plain are monotonous and are represented exclusively by saucer, less often cup-shaped small (up to 30 m

in diameter) and shallow (very rarely up to 3 m) funnels. They occur singly and do not form karst fields. A feature of their distribution is that they are often located in chains parallel to the nearest erosional incision from the west or south of it, and on the territory of Ufa clastocarst manifestations are represented by karst-suffusion subsidence.

Current development activity of clastocarst, the determining karst hazard of the territory is estimated by the frequency of karst sinkholes formation. Indeed, the frequency of the formation of karst sinkholes with a fixed formation time indirectly indicates not only the rate of dissolution and leaching of karst rocks, but also includes all the factors contributing to the formation of modern karst manifestations, and the sinkhole formation activity is the main indicator of the karst hazard of the territory [7, 11].

From published, stock and archival sources, the author has collected and systematized information about modern karst sinkholes in the Southern Urals and Cis-Urals within the boundaries of the RB over the past 100 years [12].

On the Priay Plain, in the gypsum sandstones of the Koschelevskaya Formation from 1952 to 2020, 8 large (up to 30 m in diameter and up to 32 m deep) and at least 10 small (up to 5 m in diameter and 3 m deep) sinkholes were reliably recorded. Most of them arose 2-10 km southeast of Duvan with a frequency of their formation of 0.01 pcs/km^2 per year. The largest sinkhole during this time occurred in April 1988, 2.3 km south-west of the village of Ulkundy (6 km south-east of the village of Duvan), which was recorded and examined by the author during the study of the EGP (Ulkundinsky depression). At the time of the first survey, the inlet of the sinkhole was round, 5 m in diameter. On its sides, eluvial-deluvial clays were exposed, under which fine-grained, thin-layered sandstones with leafy limestone interlayers lay. The depth of the sinkhole in the center was 22 m, and the diameter along the bottom was 10 m [8]. According to the re-examination of the sinkhole in the fall of 1988, its dimensions with a bottle-like shape from the surface were 5.5x6.5 m, along the bottom - 11x14 m, and its total depth reached 32 (!) M [4]. 33 years later, at the site of the sinkhole, as a result of the collapse of its sides, a round cone-shaped crater 26 m in diameter and 13 m in diameter was formed (fig. 4).

On the Belskaya Plain, modern clastocarst in natural conditions are extremely rare; large karst sinkholes have not been recorded in the last 100 years [12].

R.F. Abdrakhmanov et al. [2] indicate that a sharp activation of the karst-suffusion process occurs during the construction of ponds and reservoirs. The creation of a reservoir with a pressure of 10 m on the Agarda River (the Karmasan River basin) caused the dissolution of layers of gypsum and gypsum cement in argillite-like clays.As a result, a chain of craters with a diameter of up to 2 m and a depth of up to 1 m arose in the upper reach of the left slope of the valley in the second

year of operation of the pond, and then the reservoir with a capacity of 0.9 million m^3 was drained [2]. At present, the reservoir is being exploited, and in the last 30 years, no such phenomena have been recorded during the creation of small reservoirs on the Pribelskaya plain.

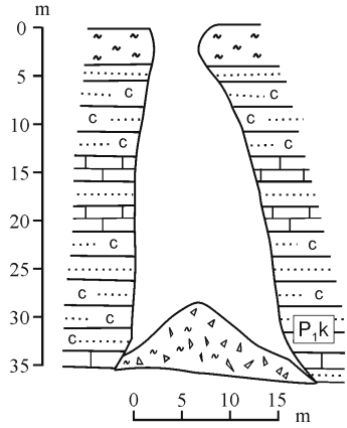

Figure 4. *Ulkunda karst sinkhole*
Geological section (above) by A. Smirnov, April 1988,
photo (bottom) by Y. Sokolov, September 2021.

Thus, the current activity of the development of clastocarst both in the scale of its manifestation and in the frequency of the formation of its new surface forms on

the Priay plain is several times higher than on the Pribelskaya.

Conclusions

According to the composition of karst rocks, Clastocarst is a peculiar, not traditional type of karst. In essence, it is a sulfate-carbonate (sulfate and carbonate) type of karst. A fundamental difference from it, clastocarst develops not in independently occurring sulfate and carbonate strata, as, for example, in the region under consideration along the western border of the Ufa plateau in the zone of their facies replacement with each other, but as inclusions in hardly soluble sedimentary sandy-clayey rocks in the form of cementing material or in the form of nests, interlayers and lenses of karst rocks. That is, clastocarst in the region fully corresponds to its definition by G.A. Maskimovich.

The most widespread and modern activity of development of clastocarst was received on the Priay plain than on the Pribelskaya, which is undoubtedly associated with the greater gypsum content of Permian terrigenous rocks in the first than in the second. At the same time, on the Pribelskaya Plain, the development of clastocarst is dominated by the carbonate component, which, as is well known, has a lower dissolving capacity than the sulfate one.

In conclusion, it should be noted that further research of clastocarst in the region is interesting to focus on monitoring the development of its manifestations, which does not require significant material costs, but the results of which can provide valuable material about the current activity of its development.

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References

1. Abdrakhmanov R.F., Durnaeva V.N., Poleva A.O., Bakieva A.R. Assessment of the modern activity of carbonate karst with the establishment of geological and hydrogeological features of its development in the Neogene-Quaternary time // Geological Bulletin. 2021. № 1. P. 105-114. DOI: 10.31084/2619-0087/2021-1-10.

2. Abdrakhmanov, R.F., Martin, V.I., Popov, V.G., Rozhdestvensky, A.P., Smirnov, A.I., Travkin, A.I. Karst of Bashkortostan. Ufa: Informreklama, 2002. 383 P.

3. Abdrakhmanov R.F., Popov V.G. About clastocarst of the Bashkir Urals // The problem of pseudokarst: Abstracts of the meeting. Perm., 1992. P. 18-19.

4. Kudryashov A.I. Karst sinkholes of the Yuryuzan-Ai depression // Disasters

and accidents in karst territories: Abstracts. Perm, 1990. P. 38-39.

5. Maksimovich G.A. Fundamentals of karst studies. Volume 1. Questions of karst morphology, speleology and hydrogeology of karst / Perm. stat. un-ty n.a. A. M. Gorky. Perm: Publishing house, 1963. 445 P.

6. Martin V.I. Karst // Hydrogeology of the USSR. V. XV (Bashkir ASSR). Chapter IV. M.: Bowels, 1972. P. 77-91.

7. Martin V.I. Types and regionalization of karst in Bashkortostan // Abdrakhmanov R.F., Martin V.I., Popov V.G. A.P. Rozhdestvensky, A.I. Smirnov, A.I. Travkin Karst of Bashkortostan. Ufa: Informreklama, 2002. P. 133-176.

8. Smirnov A.I. Wells in sandstones on the Priay plain // Sec. Bulletin of Kiev. karst-speleol. center, 1992. № 1 (3). P. 8-9.

9. Smirnov A.I. Types of karst and modern activity of its development in the Southern Urals and the Cis-Urals. Materials of the international. Symposium "Karst Studies – XXI Century: Theoretical and Practical Significance"., Perm: Perm University, 2004. P. 90-94.

10. Smirnov A.I. Karst. Atlas of the Republic of Bashkortostan. Government of the Republic of Bashkortostan. Ufa, 2005. P. 60.

11. Smirnov A.I. Assessment of the karst hazard of the Southern Urals and the Cis-Urals. Environmental safety and construction in karst areas Materials of the International Symposium, Russia, Perm, May 26–29, 2015 P. 194-198.

12. Smirnov A.I. Modern karst sinkholes on the territory of the Southern Urals and the Cis-Urals (within the boundaries of the Republic of Bashkortostan) // Engineering Geology, 2020 Vol. XV, № 4, P. 42–53. DOI: 10.25296/1993-5056-2020-15-4-42-53

13. Smirnov A.I., Abdrakhmanov R.F. Karst of the Priay plain in the Southern Cis-Urals In the book: Geology, minerals and problems of geoecology of Bashkortostan, the Urals and adjacent territories. Materials of the Twelfth Interregional Scientific and Practical Conference. 2018. P. 406-411.

14. Timofeev D.A., Dublyansky V.N., Kiknadze T.Z. Karst terminology. M.: Science, 1991. 259 P.

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